FILE NO.

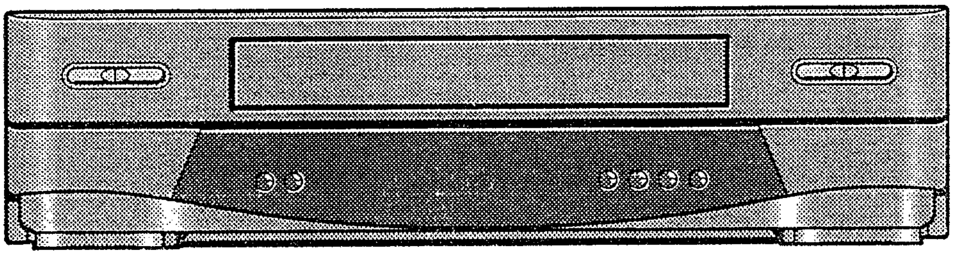
SANYO

SERVICE MANUAL

Video Cassette Recorder

VHR-330G

(Germany)



VHS PAL

CONTENTS

1. DISASSEMBLY 2
2. ELECTRICAL ADJUSTMENT 6
3. TEST POINT FOR TAPE PATH ADJUSTMENT 14
4. PARTS LIST
   ACCESSORIES 15
   PACKING MATERIALS 15
   CABINET & CHASSIS PARTS 15
   MECHANISM PARTS 16
   ELECTRICAL PARTS 19

CIRCUIT DIAGRAMS (Refer to the separate volume)

Please see other materials with Reference No. given in table below.

Materials	Model No.	Reference No.
Mechanism Manual	P90 Mechanism	WM-530599
	P92 Mechanism	MS531206

PRODUCT SAFETY NOTICE

The components designated by a symbol (⚠) in this schematic diagram designates components whose value are of special significance to product safety. Should any component designated by a symbol need to be replaced, use only the part designated in the Parts List. Do not deviate from the resistance, wattage and voltage ratings shown.

NOTE: 1. Parts order must contain Model Number, Part Number and Description.
2. Substitute parts may be supplied as the service parts.
3. N.S.P.: Not available as service parts.

TP1/G 143 147 09

REFERENCE No. SM531333

1. DISASSEMBLY

1-1. REMOVAL OF CABINET, MECHANISM UNIT AND MAIN BOARD

REMOVING THE CABINET PARTS (Fig. 1.1.1)

1. Remove the cabinet and bottom cover by removing the four screws (A) and five screws (B).
2. Remove the front panel by removing the locks of the clamps (C) using a screwdriver, etc. and slightly rotating the bottom part in the direction of the arrow.

NOTE: Electrical adjustments for the this model can be performed with only the cabinet removed.

REMOVING THE MECHANISM MAIN UNIT (Fig. 1.1.2)

After removing the cabinet parts:

1. Remove the two screws (D), and then remove the bracket.
2. Remove the 29-wire flat cable from the MC-2 PWB, and then remove the 8-wire flat cable from the VP-1 PWB Ass'y.
3. Remove the mechanism main unit by removing the two screws (E) and two screws (F).
   Remove, as well, the two screws (G) at the cassette tray side while pressing the tray lock lever as shown in the enlarged view and pushing the cassette tray to the position where the two screws (G) appear.

REMOVING THE CP-1 PWB ASSEMBLY (Fig. 1.1.3)

After removing the cabinet parts and the mechanism unit:

1. Pull out the TM-1 PWB Ass'y from CN301 and CN302 while pressing and spreading out the four clamps (H) as shown by the arrows.
2. Remove the holder set to the opening of the chassis, while pressing the clamp in the direction of the arrow.
3. Remove the two red screws (J). Next, remove the CP-1 PWB Ass'y by lifting it straight up while pressing and spreading out the two clamps (K) as shown by the arrows.

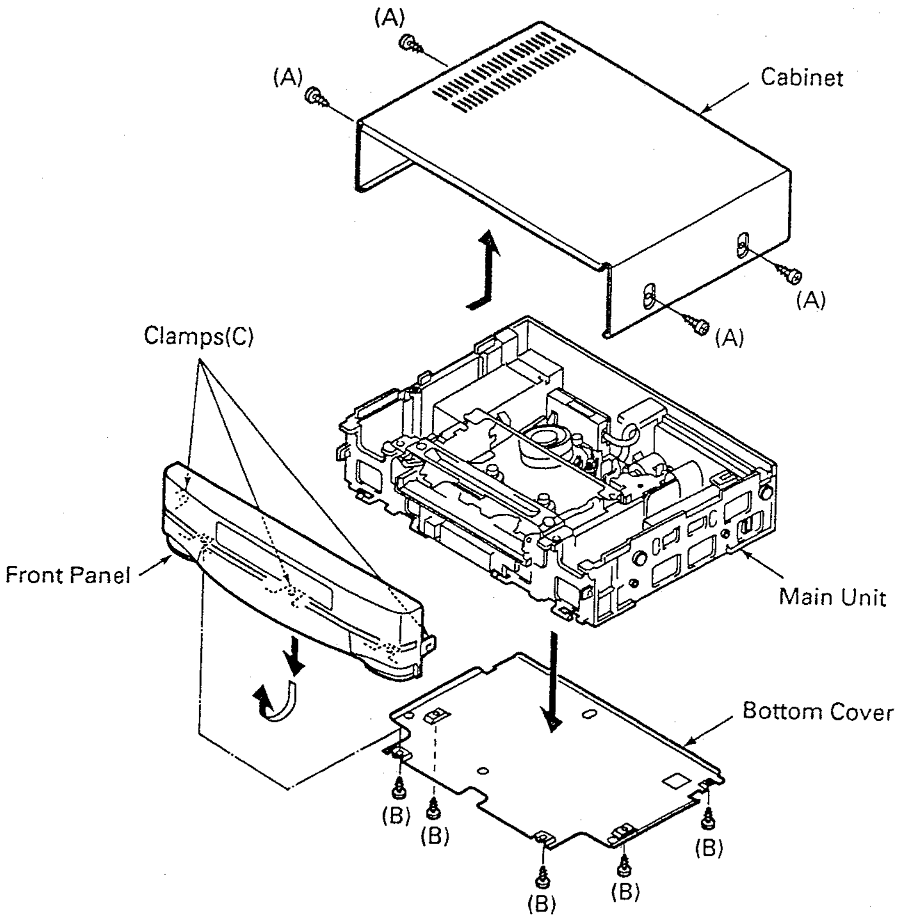


Fig. 1.1.1

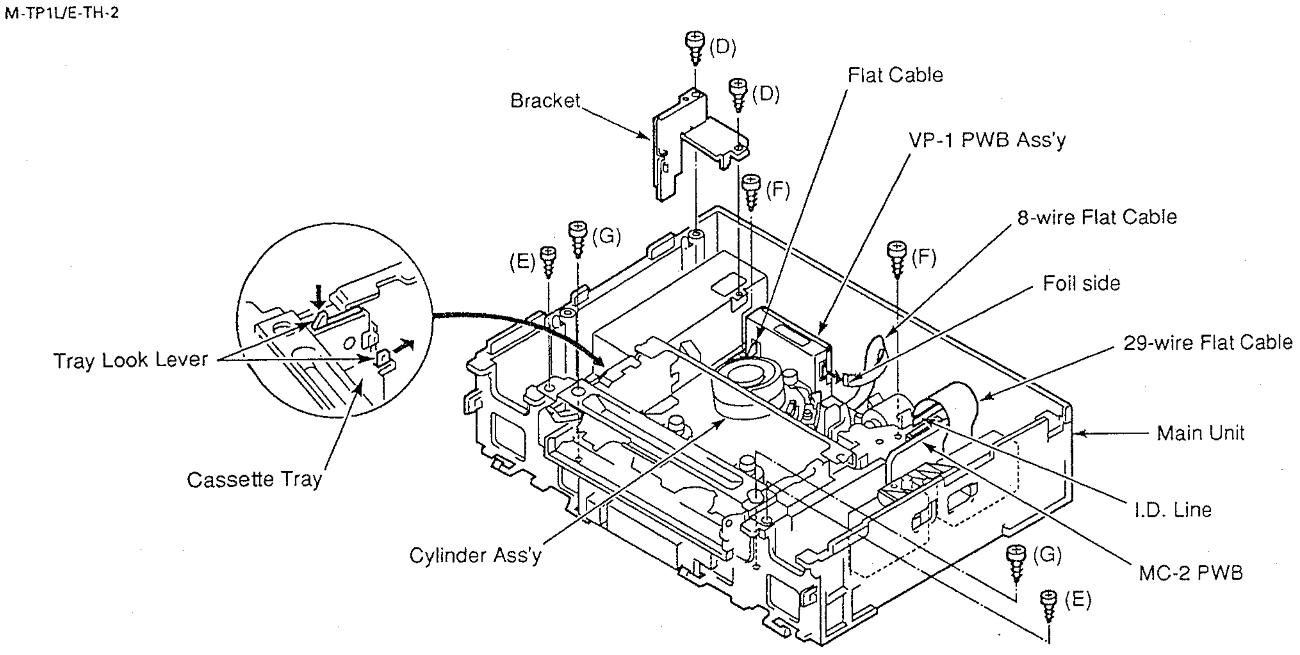

M-TP1L/E-TH-2
(D)
(D)
Bracket
Flat Cable
VP-1 PWB Ass'y
(F)
8-wire Flat Cable
(G)
(E)
(F)
Foil side
29-wire Flat Cable
Tray Look Lever
Main Unit
Cassette Tray
I.D. Line
Cylinder Ass'y
(G)
MC-2 PWB
(E)

Fig. 1.1.2

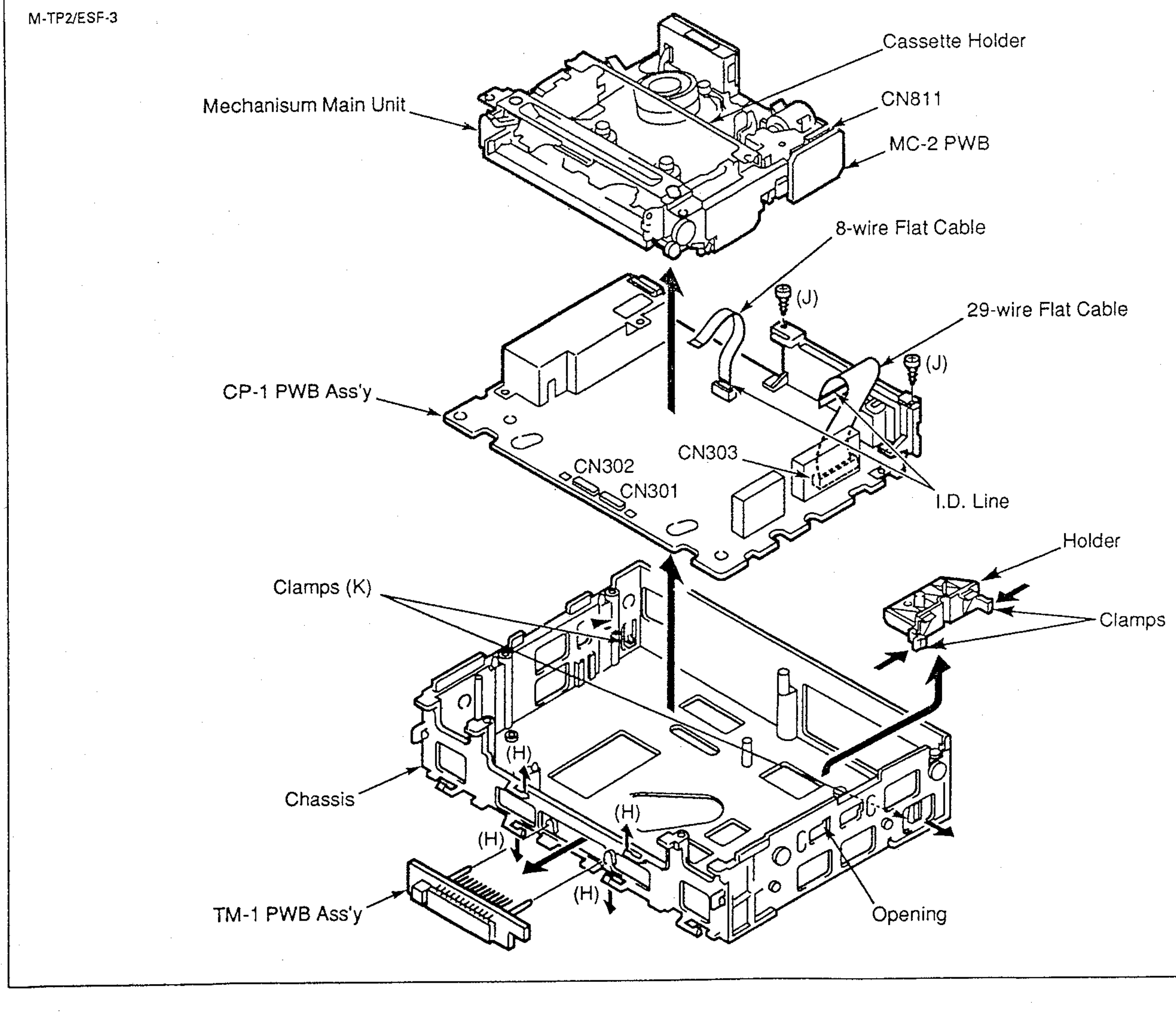

M-TP2/ESF-3
Cassette Holder
CN811
Mechanisum Main Unit
MC-2 PWB
8-wire Flat Cable
(J)
29-wire Flat Cable
(J)
CP-1 PWB Ass'y
CN303
CN302
CN301
I.D. Line
Holder
Clamps (K)
Clamps
(H)
Chassis
(H)
(H)
(H)
TM-1 PWB Ass'y
Opening

Fig. 1.1.3

TEMPORARILY SETTING UP AND CONNECTING MAIN PWB ASSEMBLY

The following is an example of how to place and connect the main PWB not requiring a jig, when repairing the CP-1 PWB assembly (Fig. 1.1.4)

1. Place the mechanism main unit at the fixed position on the chassis.
2. Connect the 29-wire flat cable to the MC-2 PWB , and the 8-wire flat cable to the VP-1 PWB Ass'y respectively. Connect the TM-1 PWB Ass'y to operate the VCR by using the remote control.
3. Place the CP-1 PWB Ass'y above the mechanism main unit along the cassette holder. Insert the tip (L) of the terminal board into the opening (M) at the side of the chassis, as shown in the enlarge view.

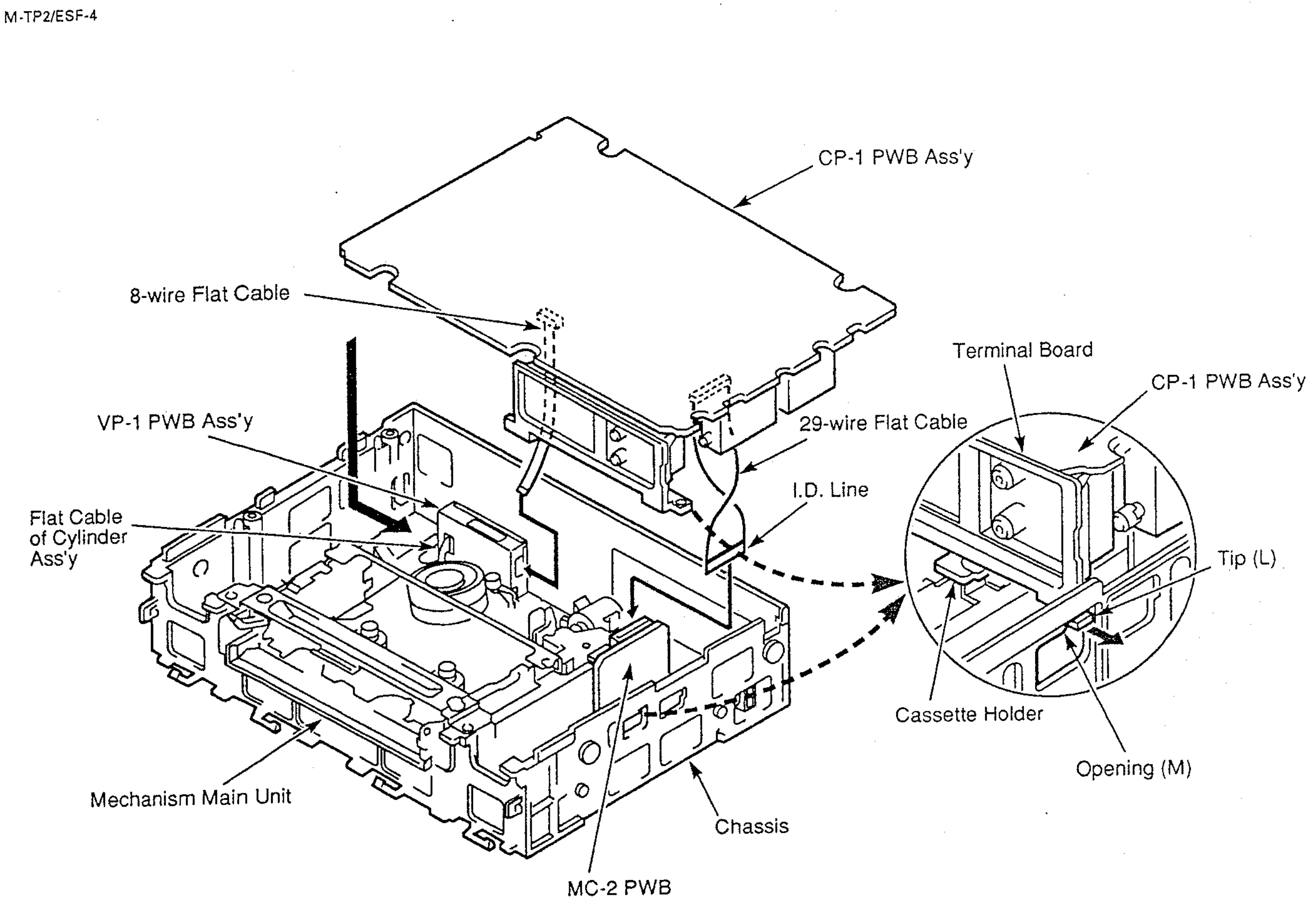

M-TP2/ESF-4
CP-1 PWB Ass'y
8-wire Flat Cable
Terminal Board
CP-1 PWB Ass'y
VP-1 PWB Ass'y
29-wire Flat Cable
I.D. Line
Flat Cable of Cylinder Ass'y
Tip (L)
Cassette Holder
Opening (M)
Mechanism Main Unit
Chassis
MC-2 PWB

Fig. 1.1.4

1-2. MAIN CIRCUIT BOARD LOCATIONS

L-TP4/IR(21)

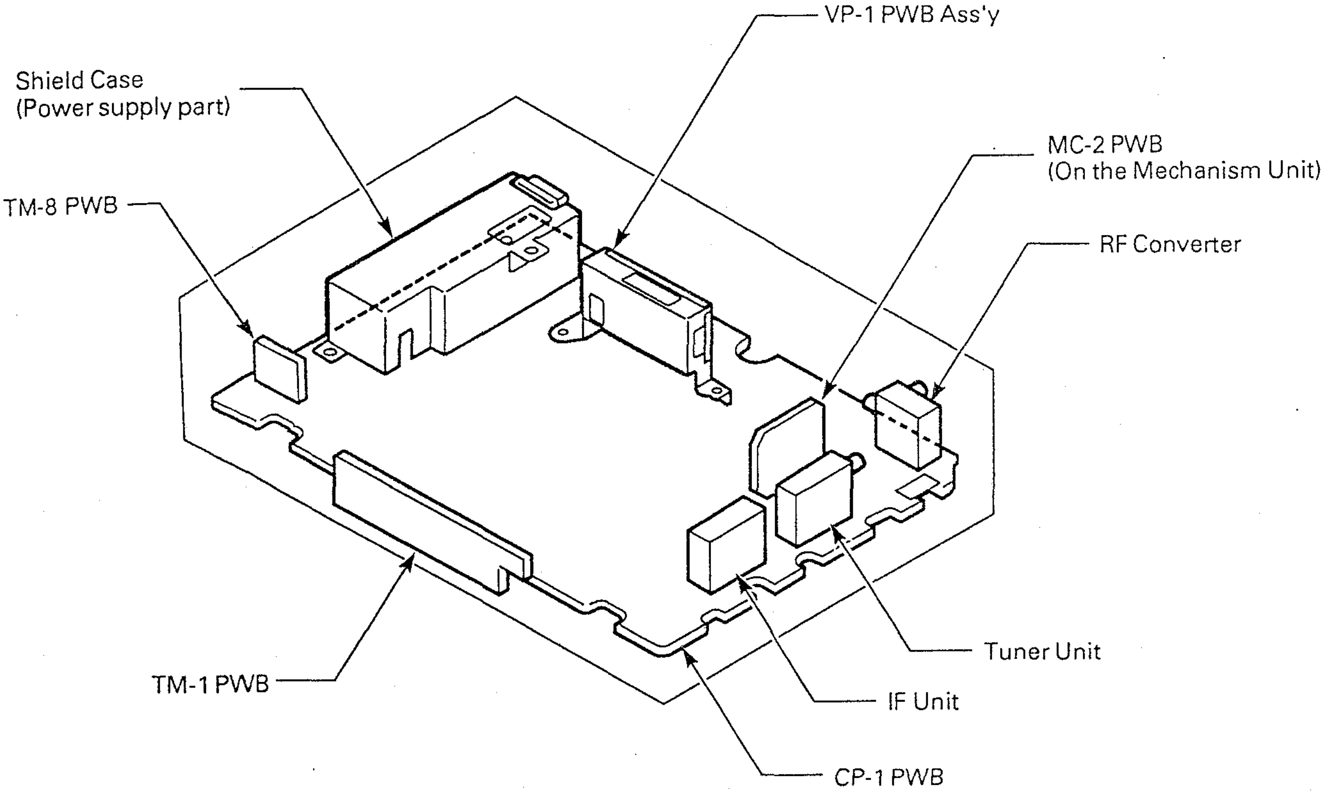

VP-1 PWB Ass'y
Shield Case
(Power supply part)
MC-2 PWB
(On the Mechanism Unit)
TM-8 PWB
RF Converter
Tuner Unit
TM-1 PWB
IF Unit
CP-1 PWB

Fig. 1.2.1

2. ELECTRICAL ADJUSTMENT

PREPARATION

This VCR need 4 basic presetting by using the menus displayed on-screen.
After all connection have been made, then follow steps 1 to 4 to preset the VCR.
The 4 presetting steps will be displayed in sequence on TV screen. The setting are entered with the remote control.

Turn on the VCR

1. Adjusting the TV receiver to the video channel: The WELCOME screen will appear. When the video channel has been preset, press the OK button on the remote control.
2. Language selection: Select the desired language, then press the OK button.
3. Clock setting: Using the remote control numeric buttons, enter the date and time, press the OK button.
4. Tuning control adjustments: When the channel position has been preset, press the MENU/TV button. When steps 1 to 4 have been finish, ready to operate the all operating mode.

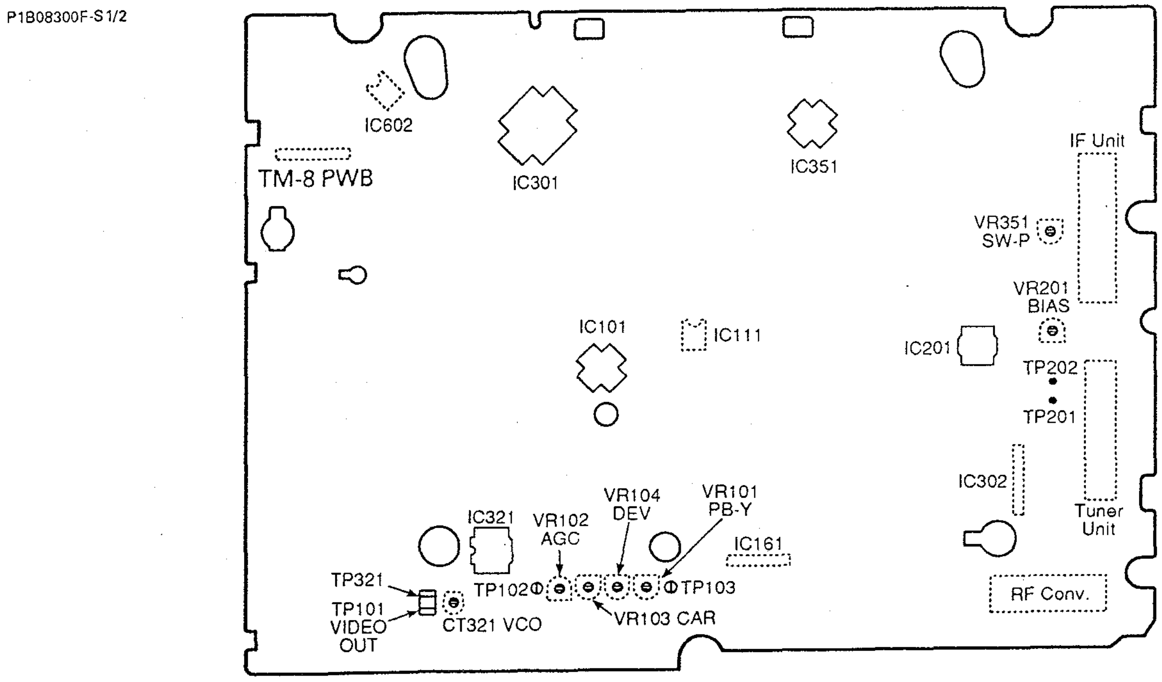
2-1. SERVO CIRCUIT ADJUSTMENT

- These adjustments should be carried out upon completion of the tape transport adjustments.
- If the tape transport adjustments (except the tilt adjustment) are carried out after these adjustments, follow the procedures again in Section 2-1-3. SWITCHING POSITION ADJ.
- When a cassette tape is loaded, auto-tracking will be set immediately after starting the first playback. As this will deviate the tracking center set, be sure to press the channel buttons (+) or (–) once directly after starting playback to prevent auto-tracking from being set.

2-1-1. TEST EQUIPMENT AND STANDARDS REQUIRED

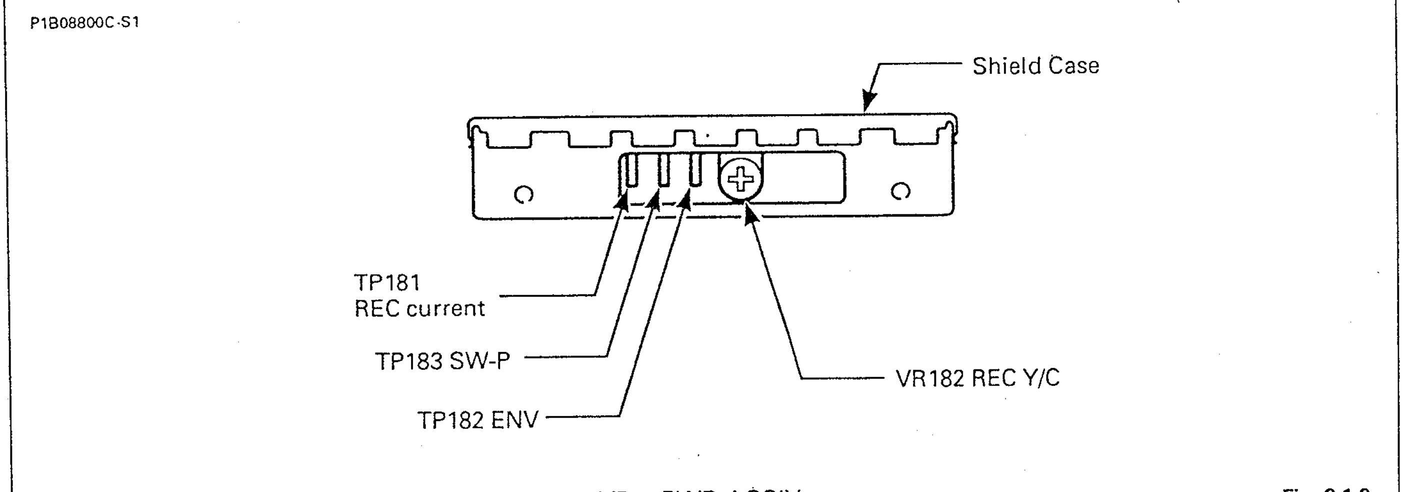
Oscilloscope	Vertical sensitivity: 5 mV/DIV, external trigger Band width: more than 10 MHz
Test Tape	VHJ-0009 or VHJ-0023: SP mode, monoscope, 6 KHz
Blank Tape	VHS-type cassette tape
Monitor TV	

2-1-2. LOCATION OF ADJUSTMENT POINTS


P1B08300F-S1/2
IC602
TM-8 PWB
IC301
IC351
IF Unit
VR351
SW-P
VR201
BIAS
IC101
IC111
IC201
TP202
TP201
IC302
Tuner
Unit
VR104
DEV
VR101
PB-Y
IC321
VR102
AGC
IC161
TP321
TP102
TP103
RF Conv.
TP101
VIDEO
OUT
CT321 VCO
VR103 CAR

CP-1 PWB (FOIL SIDE)

Fig. 2.1.1


P1B08800C-S1
Shield Case
TP181
REC current
TP183 SW-P
TP182 ENV
VR182 REC Y/C

VP-1 PWB ASS'Y

Fig. 2.1.2

NOTE:

- Self-recording means "Record any broadcasting or video signal and play back the just-recorded portion".

2-1-3. SWITCHING POSITION ADJ.

Measuring Point	Measuring Equipment	ADJ. Condition
TP101 (VIDEO OUT) TP183 (SW-P)	Oscilloscope	PLAY mode Test tape (VHJ-0009 or VHJ-0023)

ADJ. Location	ADJ. Value
VR351 (SW-P)	6.5 H ± 0.5 H

1. Set the tracking control position to the center by pressing CHANNEL buttons (+) and (–) simultaneously. (Tracking center position display in the indicator panel "T –:– ")
2. Adjust VR351 (SW-P) so that the width "T" becomes **6.5 H ± 0.5 H** as shown in Fig. 2.1.3.

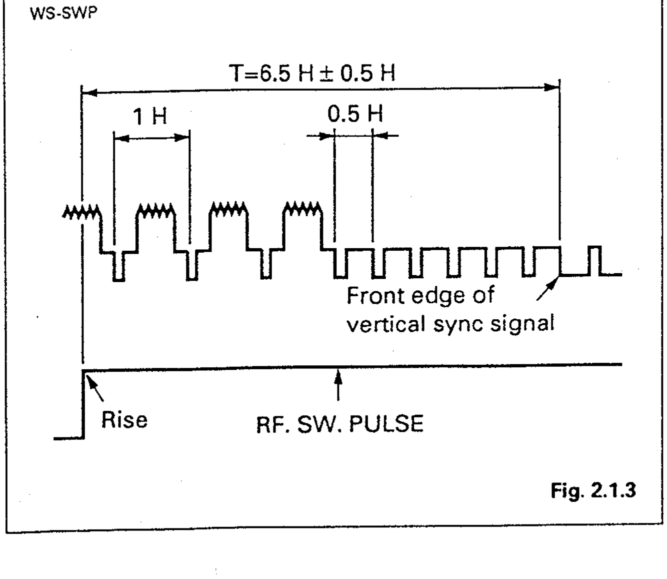

WS-SWP
T=6.5 H ± 0.5 H
1 H
0.5 H
Front edge of
vertical sync signal
Rise
RF. SW. PULSE

Fig. 2.1.3

2-1-4. STILL V-LOCK ADJ.

Measuring Point	Measuring Equipment	ADJ. Condition
Picture of monitor TV	Color bar generator or Broadcasting Monitor	Self-recording STILL mode Blank tape

ADJ. Location	ADJ. Value
CHANNEL (+) button CHANNEL (–) button	The minimum vertical shake

1. Play back the just-recorded portion and then set the VCR in the STILL mode.
2. Press the CHANNEL (+) button or the CHANNEL (–) button so that any vertical shake of the picture is brought to its minimum.

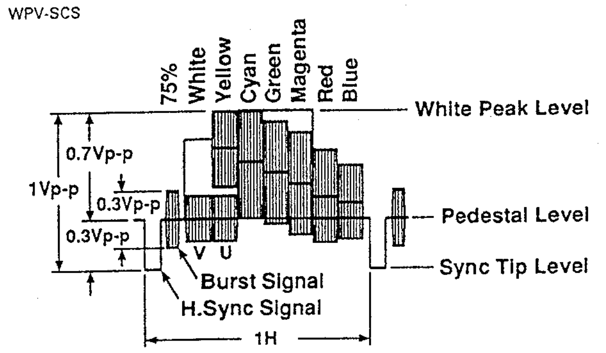
2-2. VIDEO CIRCUIT ADJUSTMENT

- Before making the following adjustments, Section 2-1. SERVO CIRCUIT ADJUSTMENT should be completed.
- Use the relay jig to provide simple adjustment of the VP-1 PWB Ass'y.

2-2-1. TEST EQUIPMENT AND STANDARDS REQUIRED

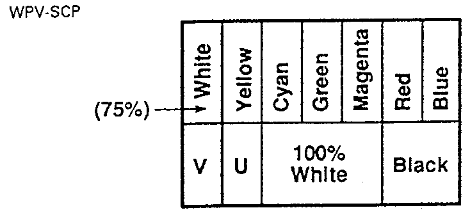
Color Bar Signal Generator	PAL Color bar signel with 100% white level (EBU color bar signel) (Signal waveform is described below. Refer to Fig. 2.2.1)
Oscilloscope	Vertical sensitivity: 5 mV/DIV, external trigger Band width: more than 10 MHz
Digital Voltmeter	DC range
Test Tape	VHJ-0008 or VHJ-0023: SP mode, color bar, 1kHz (Color bar signal waveform is described below. Refer to Fig. 2.2.3)
Blank Tape	VHS-type cassette tape
Oscilloscope Probe	Input capacity: less than 25 pF (10:1) less than 40 pF (1:1) Covering frequency: DC ~ 40 MHz (10:1) DC ~ 30 MHz (1:1)
Frequency Counter	8 significant digits
Adjustment Relay Jig	VHJ-0065: 5-wire flat cable for VP-1 PWB Ass'y

PAL TV TEST SIGNAL


WPV-SCS
75%
White
Yellow
Cyan
Green
Magenta
Red
Blue
White Peak Level
0.7Vp-p
1Vp-p
0.3Vp-p
0.3Vp-p
V U
Pedestal Level
Sync Tip Level
Burst Signal
H.Sync Signal
1H

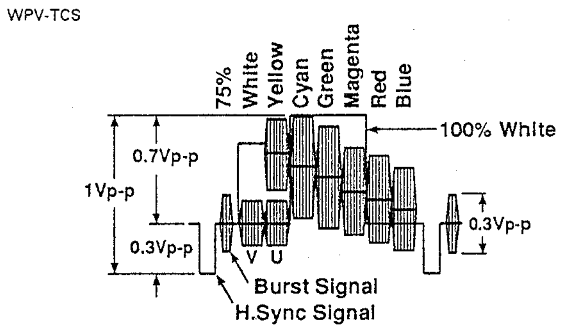
COLOR BAR SIGNAL WAVEFORM

Fig. 2.2.1


WPV-SCP
(75%)
White
Yellow
Cyan
Green
Magenta
Red
Blue
V
U
100% White
Black

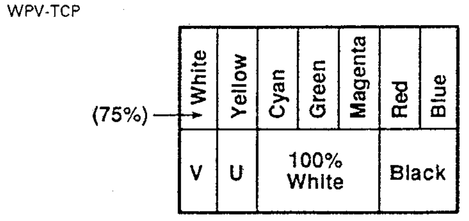
COLOR BAR PATTERN MONITOR TV

Fig. 2.2.2


WPV-TCS
75%
White
Yellow
Cyan
Green
Magenta
Red
Blue
100% White
0.7Vp-p
1Vp-p
0.3Vp-p
0.3Vp-p
V U
Burst Signal
H.Sync Signal

COLOR BAR SIGNAL WAVEFORM (VHJ-0008)

Fig. 2.2.3

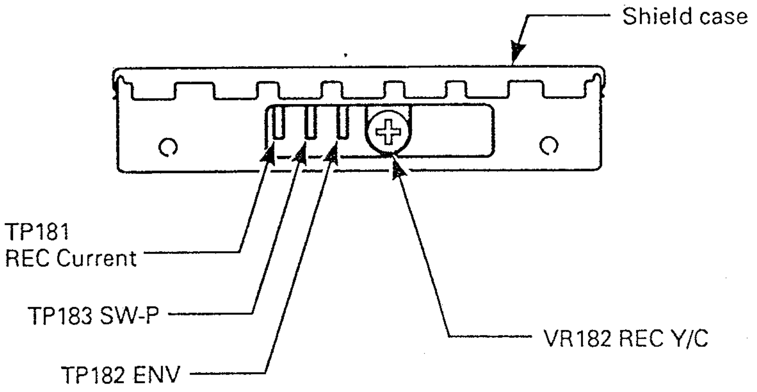

WPV-TCP
(75%)
White
Yellow
Cyan
Green
Magenta
Red
Blue
V
U
100% White
Black

COLOR BAR PATTERN (VHJ-0008) ON MONITOR TV

Fig. 2.2.4

2-2-2. LOCATION OF ADJUSTMENT POINTS

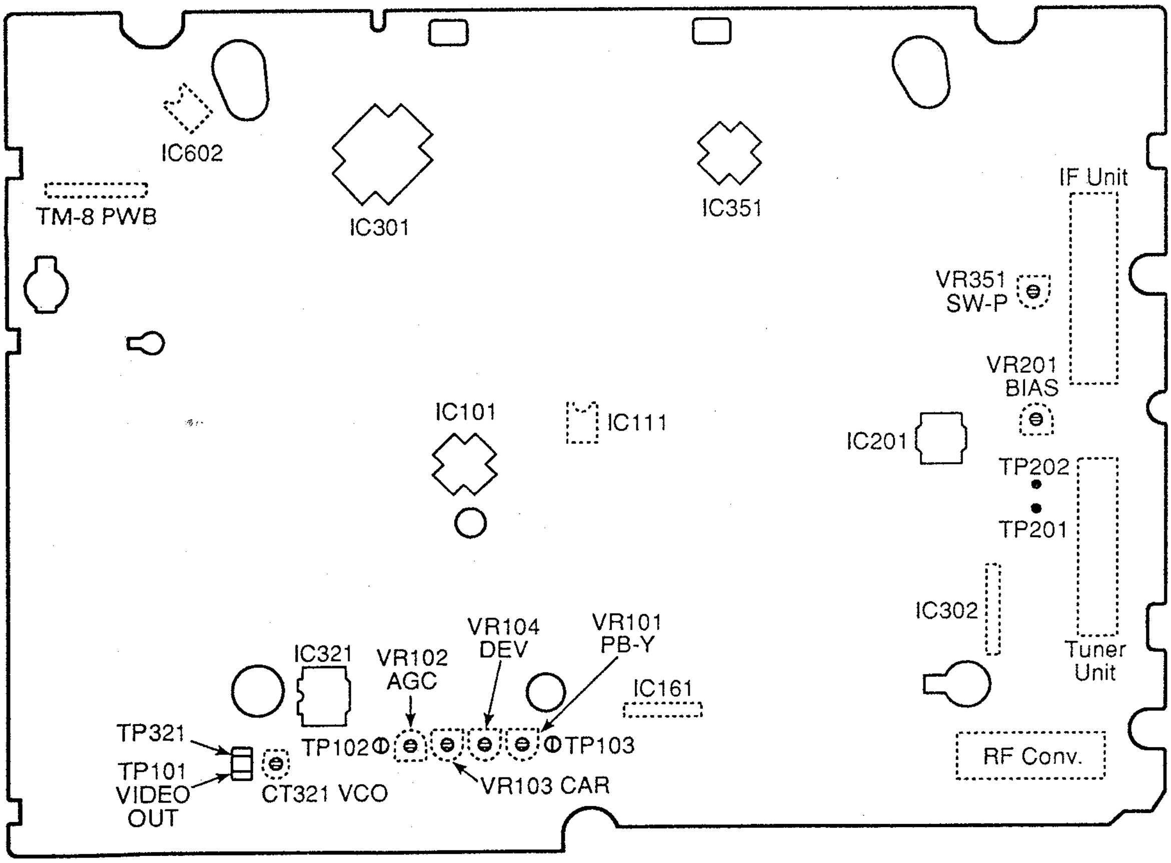
P1B08800C-V1


Shield case
TP181
REC Current
TP183 SW-P
TP182 ENV
VR182 REC Y/C

VP-1 PWB ASS'Y

Fig. 2.2.5

P1B08300F-V1/2


IC602
TM-8 PWB
IC301
IC351
IF Unit
VR351
SW-P
VR201
BIAS
IC101
IC111
IC201
TP202
TP201
IC302
Tuner
Unit
IC321
VR102
AGC
VR104
DEV
VR101
PB-Y
IC161
TP321
TP101
VIDEO
OUT
TP102
TP103
CT321 VCO
VR103 CAR
RF Conv.

CP-1 PWB (FOIL SIDE)

Fig. 2.2.6

2-2-3. ADJUSTMENT RELAY JIG

Connect the Flat cable end from the Cylinder Ass'y to the VP-1 PWB Ass'y using the Relay jig to provide simple repairing and adjustment of the VP-1 PWB Ass'y, as shown in Fig. 2.2.7. Further, when adjusting the VP-1 PWB Ass'y, be sure to make contact an end of Shield case with Bracket of the VP-1 PWB Ass'y to maintain the shield effect. If the VP-1 PWB Ass'y does not contact, there is insufficient ground and no proper play back image can be obtained.

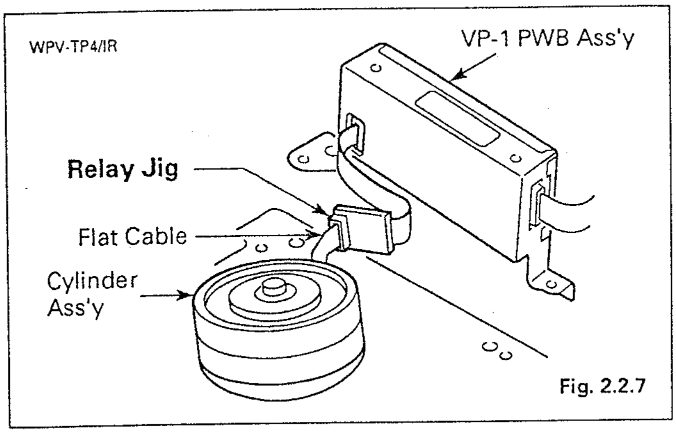


Fig. 2.2.7

NOTES:

- Self-recording means "Record the video signal and play back the just-recorded portion".
- Connect the monitor TV to the VIDEO OUTPUT terminal before making following adjustments.

2-2-4. AGC LEVEL ADJ.

Measuring Point	Measuring Equipment	ADJ. Condition
TP102	Color bar generator Oscilloscope (10:1 probe)	E-E mode

ADJ. Location	ADJ. Value
VR102 (AGC)	0.5 Vp-p ± 0.025 Vp-p

1. Connect the color bar generator to the VIDEO INPUT terminal.
2. Adjust VR102 (AGC) for **0.5 Vp-p ± 0.025 Vp-p** as shown in Fig. 2.2.8.

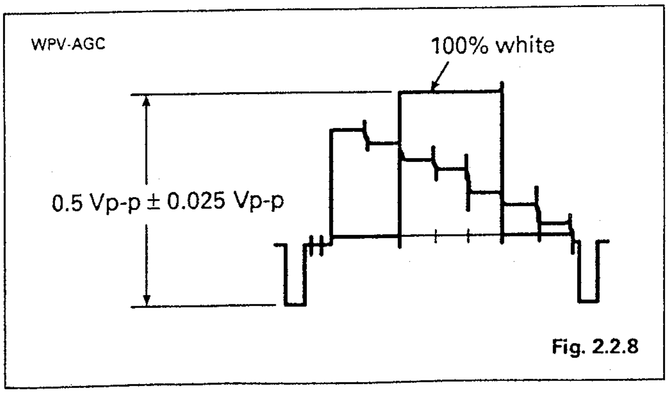


Fig. 2.2.8

2-2-5. PB-Y LEVEL ADJ.

Measuring Point	Measuring Equipment	ADJ. Condition
TP101	Oscilloscope	PLAY mode Test tape (VHJ-0008 or VHJ-0023)

ADJ. Location	ADJ. Value
VR101 (PB-Y)	1 Vp-p ± 0.05 Vp-p

1. Play back a test tape.
2. Adjust VR101 (PB-Y) for the video luminance signal level of **1 Vp-p ± 0.05 Vp-p**. (Refer to Fig. 2.2.9)

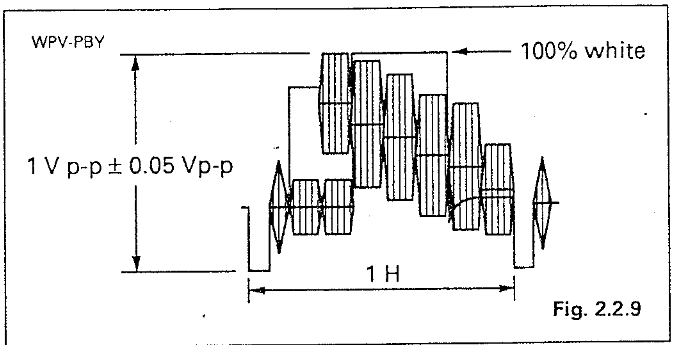


Fig. 2.2.9

2-2-6. CARRIER SET ADJ.

Measuring Point	Measuring Equipment	ADJ. Condition
TP103	Color bar generator Frequency counter	REC mode

ADJ. Location	ADJ. Value
VR103 (CAR)	3.83 MHz ± 0.05 MHz

1. Connect the color bar generator to the VIDEO INPUT terminal.
2. After removing the first color bar signal input from the video input terminal, immediately adjust VR103 (CAR) so that the frequency becomes **3.83 MHz± 0.05 MHz.**

2-2-7. VCO (on screen assist) ADJ.

Measuring Point	Measuring Equipment	ADJ. Condition
TP321	Color bar generator Digital voltmeter	REC • E-E mode

ADJ. Location	ADJ. Value
CT321 (VCO)	2.5 Vp-p ± 0.3 Vp-p

1. Connect the digital voltmeter (DC range) to TP321 and GND.
2. Adjust CT321(VCO) so that the voltage is **2.5 V ± 0.3 V.**

2-2-8. DEVIATION ADJ.

Measuring Point	Measuring Equipment	ADJ. Condition
TP101	Color bar generator Oscilloscope	Self-recording mode Blank tape

ADJ. Location	ADJ. Value
VR104 (DEV)	1 Vp-p ± 0.05 Vp-p

1. Record the color bar signal on the blank tape.
2. Play back of the just-recorded portion.
3. Adjust VR104 (DEV) for **1 Vp-p ± 0.05 Vp-p** as shown in Fig. 2.2.10.
4. If the adjustment value is not satisfactory, adjust VR104 (DEV) and repeat steps 2 to 3.

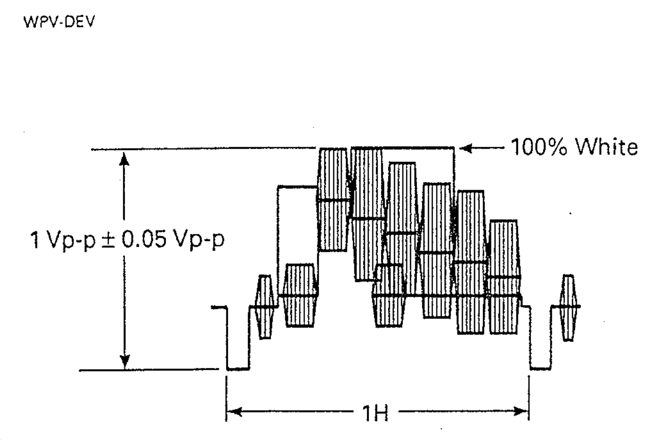


Fig. 2.2.10

2-2-9. Y/C REC CURRENT ADJ.

Measuring Point	Measuring Equipment	ADJ. Condition
TP181 (on VP-1 PWB)	Color bar generator Oscilloscope (1:1 probe)	REC mode Blank tape

ADJ. Location	ADJ. Value
VR182 (REC-Y/C)	600 mVp-p ± 25 mVp-p

1. Connect the ground of the oscilloscope to the shield case of the VP-1 PWB Ass'y.
2. Adjust VR182 (REC-Y/C) so that the video luminance signal level at the sync tip is **600 mVp-p ± 25 mVp-p**. (Refer to Fig. 2.2.11)

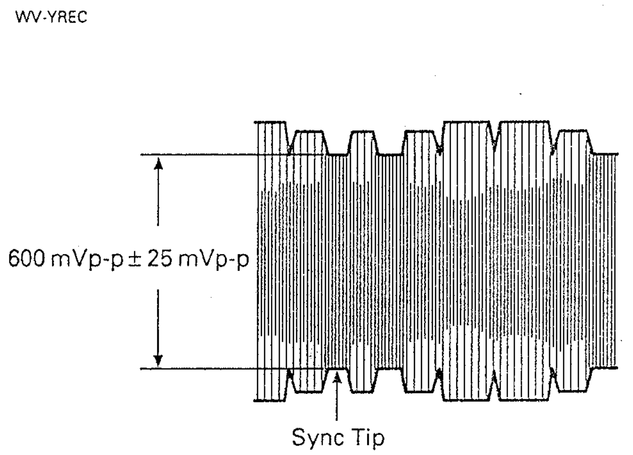


Fig. 2.2.11

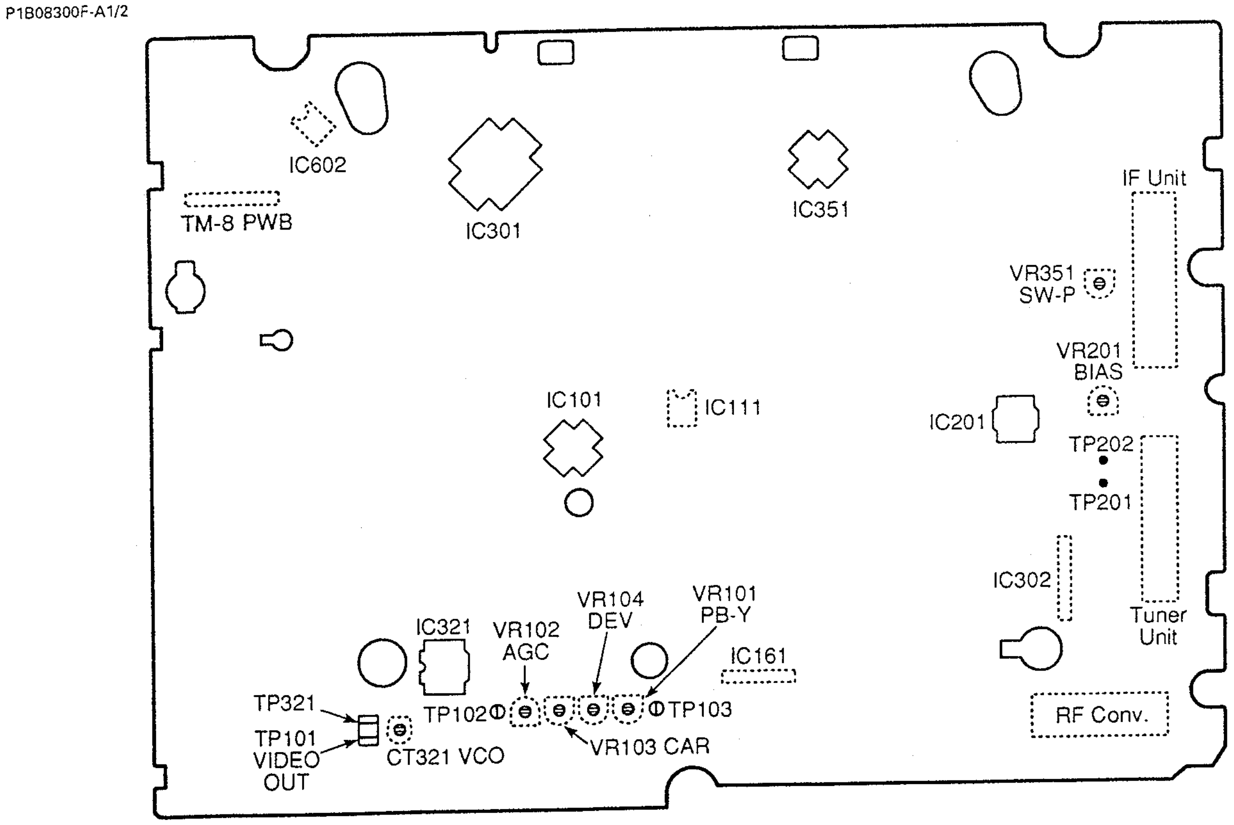
2-3. AUDIO CIRCUIT ADJUSTMENT

- Before making these adjustments, (especially, the tape guide height and audio control erase head height adjustments) should be carried out, so that the tape traveling between the loading guide pole and the audio control erase head runs without fluttering, twisting, curling.
- Before making these adjustments, Section 2-1. SERVO and Section 2-2. VIDEO circuit adjustments should be carried out.

2-3-1. TEST EQUIPMENT AND STANDARDS REQUIRED

Standard Audio Signal Generator (SG)	Output frequency : 10 Hz ~ 20 kHz Output level : more than 1 Vrms Output impedance : 600 Ω Distortion ratio : less than 0.1% Output in use SG : Frequency: .... 400 Hz, 10 kHz (switchable) Output level: .... –33.8 dBs ± 0.5 dB
Color Bar Signal Generator	Color bar signel with 100% white level. (Signal waveform is described before. Refer to Fig. 2.2.1)
Oscilloscope	Vertical sensitivity : 10 mV/DIV Band width : more than 30 MHz
AC Voltmeter	Effective value indication Input frequency : 10 Hz ~ 20 kHz Input Impedance : more than 1 MΩ Measurement level : 1mV (full scale)
Blank Tape	VHS-type cassette tape

2-3-2. LOCATION OF ADJUSTMENT POINTS


P1B08300F-A1/2
IC602
TM-8 PWB
IC301
IC351
IF Unit
VR351
SW-P
VR201
BIAS
IC101
IC111
IC201
TP202
TP201
IC302
Tuner
Unit
IC321
VR102
AGC
VR104
DEV
VR101
PB-Y
IC161
TP321
TP101
VIDEO
OUT
CT321 VCO
TP102
TP103
VR103 CAR
RF Conv.

CP-1 PWB (FOIL SIDE)

Fig. 2.3.1

NOTE:
- Self-recording means "Record the audio signal and play back the just-recorded portion".

2-3-3. BIAS LEVEL ADJ.

[A]

Measuring Point	Measuring Equipment	ADJ. Condition
TP201 (HOT) TP202 (GND)	Oscilloscope AC voltmeter	REC mode Blank tape

ADJ. Location	ADJ. Value
VR201 (BIAS)	23 mVrms

1. Load the VCR with a blank tape and select the record mode without all incoming signal.
2. After confirming on the oscilloscope that a 70 kHz sine wave is being output, adjust VR201 (BIAS) so that the AC voltmeter's reading is **23 mVrms.**

[B]

Measuring Point	Measuring Equipment	ADJ. Condition
AUDIO OUTPUT terminal (L)	Oscilloscope AC voltmeter Standard audio signal generator (SG: signal -33.8 dBs, 400 Hz -33.8 dBs, 10 kHz)	Self-recording Blank tape

ADJ. Location	ADJ. Value
VR201 (BIAS)	-4 dB ~ +4 dB between 400 Hz and 10 kHz

1. Connect the standard audio signal generator to the AUDIO INPUT terminal (L).
2. Set the standard audio signal generator's output level to -33.8 dBs.
3. Set the standard audio signal generator's frequency to 400 Hz and then 10 kHz. Record each of these frequency signals.
4. Play back each of the just-recorded portion.
5. Confirm that the 10 kHz level on AC voltmeter's reading is **from -4 dB to +4 dB**, compared with 400 Hz level.
6. If the 10 kHz level is less than -4 dB below 400 Hz level or more than +4 dB above 400 Hz level, Rotate VR201 (BIAS) slightly to adjust it.
7. Repeat steps 3 through 6 if necessary.

2-4. TUNER AND IF CIRCUITS ADJUSTMENT

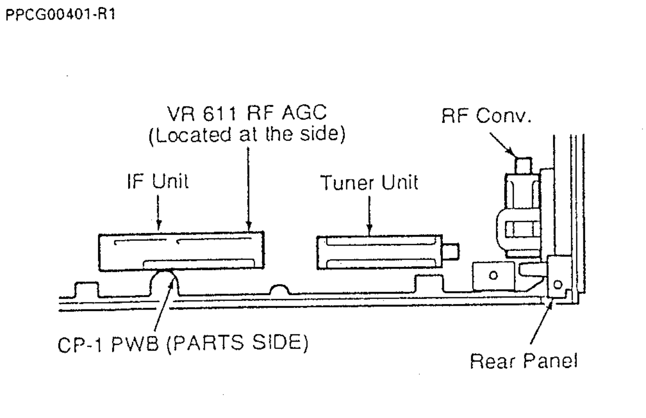
- When any malfunction occurs in the TUNER circuit the whole unit must be replaced.
- An adjustment of the IF circuit is shown as follows.

NOTE: The TUNER unit does not need any adjustments, because precise adjustments have been down before shipment.

2-4-1. TEST EQUIPMENT AND STANDARDS REQUIRED

Monitor TV	

2-4-2. LOCATION OF ADJUSTMENT POINT


PPCG00401-R1
VR 611 RF AGC
(Located at the side)
RF Conv.
IF Unit
Tuner Unit
CP-1 PWB (PARTS SIDE)
Rear Panel

IF UNIT Fig. 2.4.1

2-4-3. RF AGC ADJ.

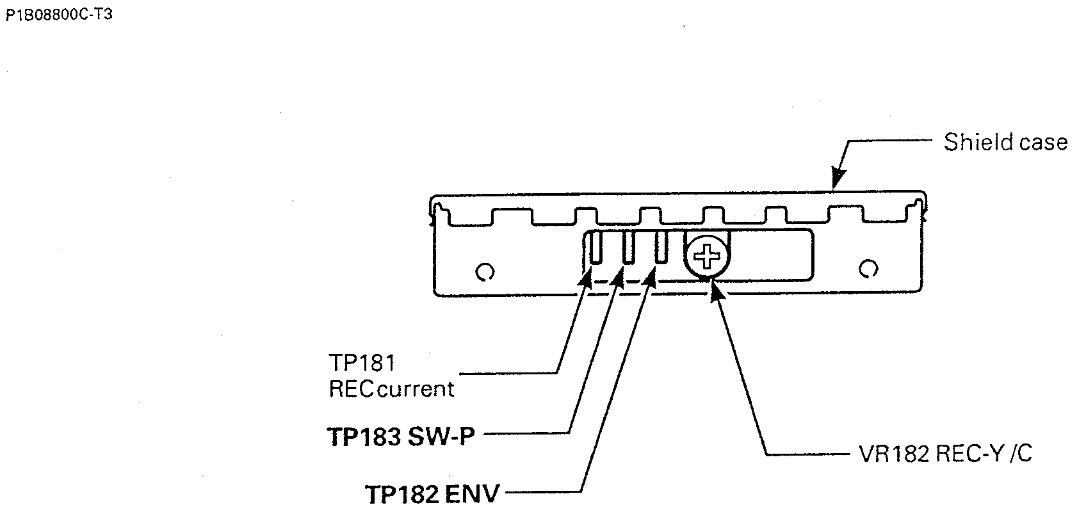
Measuring Point	Measuring Equipment	ADJ. Condition
Picture of monitor TV	Monitor TV	E-E mode

ADJ. Location	ADJ. Value
VR611 (RF AGC) (on the IF circuit)	S/N is best point

1. Connect the monitor TV to VHF/UHF ANTENNA OUTPUT terminal.
2. Connect the VHF antenna to VHF/UHF ANTENNA INPUT terminal.
3. Receive the middle electrical field (70 dBμ ~ 90 dBμ) of the VHF high channel, and slowly turn VR611 (RF AGC) from the point where snow-noise is present to the point where it just disappears from the monitor TV.
4. Confirm by monitor TV that there is no beat and saturation (S/N is best point) when receiving any TV channel.

3. TEST POINT FOR TAPE PATH ADJUSTMENT

Test point TP182 (ENV) and TP183 (SW-P) for tape path adjustment is shown in Figure below.
For adjustment, refer to the Mechanism Service Technical information (WM-530599 and MS531206).


P1B08800C-T3
Shield case
TP181
REC current
TP183 SW-P
TP182 ENV
VR182 REC-Y /C

VP-1 PWB ASS'Y Fig. 3.1

4. PARTS LIST

ACCESSORIES

LOCATION		PARTS NO.	DESCRIPTION
		645 002 2418	REMOCON(WITH COVER BATTERY)
		613 145 3227	COVER BATTERY(FOR REMOCON)
		613 154 5199	INSTRUCTION MANUAL
		613 077 4415	CABLE,ANT
OR		613 132 6125	CABLE,ANT
OR		645 003 1182	CABLE,ANT PAL
OR		645 003 3711	CABLE,ANT PAL
	⚠	613 095 0550	CORD,POWER
OR	⚠	613 133 2393	CORD,POWER
OR	⚠	645 002 6805	CORD,POWER
OR	⚠	645 003 3766	CORD,POWER

****

PACKING MATERIALS

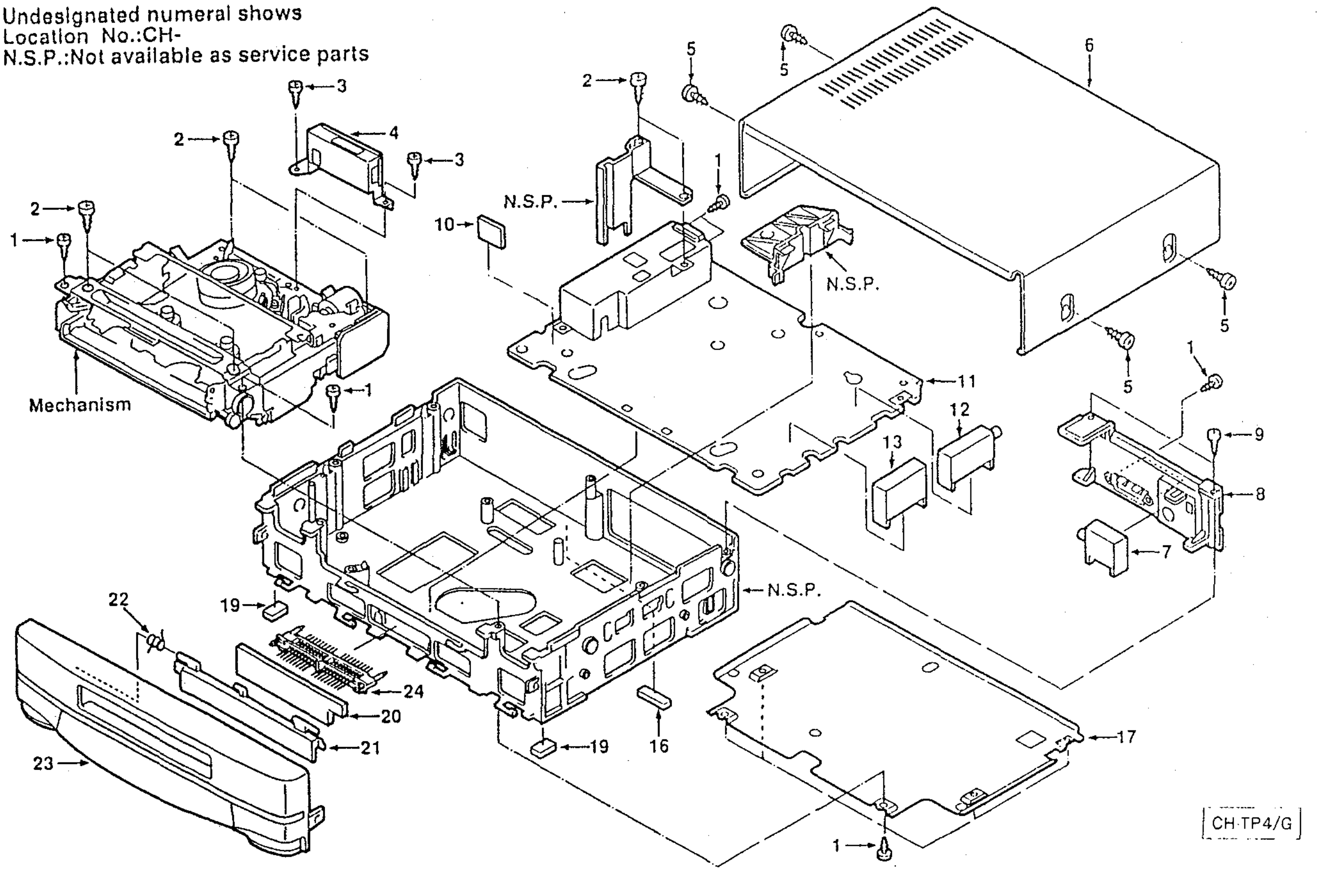
LOCATION	PARTS NO.	DESCRIPTION
	613 154 4369	CARTON CASE
	613 144 5802	CUSHION,FRONT
	613 144 5819	CUSHION,BACK
	613 139 8047	POLYE COVER,INNER-K

****

CABINET & CHASSIS PARTS

LOCATION	PARTS NO.	DESCRIPTION
CH-1	411 137 0007	SCR L-TPG BIN 3X10
CH-2	411 021 7907	SCR S-TPG BIN 4X12
CH-3	411 001 1901	SCR S-TPG BIN 3X6
CH-4	613 146 4988	COMPL PWB,VP-1
CH-5	412 028 9406	SPECIAL SCREW
CH-6	613 140 7015	COVER TOP
CH-7	613 143 8644	MODULATOR,RF
OR	613 143 8651	MODULATOR,RF
CH-8	613 144 1453	TERMINAL
CH-9	411 021 3800	SCR S-TPG BIN 3X10
CH-10	613 134 4730	COMPL PCB,TM-8
CH-11	613 154 4895	COMPL PWB,CP-1-A
CH-12	613 113 7974	TUNER PACK
CH-13	613 107 0547	IF PACK
CH-16	613 145 0707	STAND,BACK
CH-17	613 139 2182	COVER BOTTOM
CH-19	613 121 1001	STAND,FELT,FRONT
CH-20	613 144 4461	COMPL PWB,TM-1
CH-21	613 149 8846	DOOR CASSETTE
CH-22	613 140 7459	SPRING
CH-23	613 146 0447	ASSY,CABINET FRONT
CH-24	613 141 1395	PLUG,26P

Undesignated numeral shows
Location No.:CH-
N.S.P.:Not available as service parts



MECHANISM PARTS

DB306800
MB0034##

MECHANISM PARTS 1

LOCATION	PARTS NO.	DESCRIPTION
DR-1	613 142 9567	COMPL,CYLINDER,2N2S-V
OR	613 132 0468	COMPL,CYLINDER,2N2S-V
OR	613 114 2800	COMPL,CYLINDER,2N2S-V
OR	613 114 2794	COMPL,CYLINDER,2N2S-V
DR-2	411 038 1608	SCR PAN+W 3X8
DR-3	613 114 2831	ASSY,CYLINDER,UPR 2N2S-V
OR	613 114 2824	ASSY,CYLINDER,UPR 2N2S-V
DR-4	613 108 6241	ASSY,CYLINDER,LWR 2AL
OR	613 113 1354	ASSY,CYLINDER,LWR 2AL
OR	613 077 2138	ASSY,CYLINDER,LWR 2
OR	613 022 0271	ASSY,CYLINDER,LWR 2
DR-5	613 097 2170	SPACER,MOTOR 0.3T
DR-6	613 022 1001	BASE,CYLINDER
OR	613 088 9072	BASE,CYLINDER
DR-7	411 047 7509	SCR PAN+FLG 3X6
DR-8	412 030 9708	SPECIAL SCREW 2.6X8
OR	411 047 5000	SCR PAN+FLG 2.6X8
DR-9	613 085 7279	STATOR,MOTOR CYLINDER
OR	613 132 3520	STATOR,MOTOR CYLINDER
DR-10	412 036 0709	SPECIAL SCREW 2.3X10
OR	411 044 8301	SCR PAN+SW 2.3X10
OR	411 044 9209	SCR PAN+SW 2.3X8
DR-11	613 022 4019	ROTOR,MOTOR CYLINDER
DR-12	412 036 0808	SPECIAL SCREW 2.3X6
OR	411 044 9001	SCR PAN+SW 2.3X6
MB-1	613 123 4802	SLEEVE
MB-2	613 053 3227	SPECIAL WASHER
MB-3	613 123 4970	TAPE GUIDE
MB-4	411 004 5302	NUT HEX (3)
MB-5	613 123 9418	CAP
MB-6	613 152 8079	SLIDE,ACT PINCH
MB-7	613 021 9800	ASSY,LEVER,CAM PINCH
MB-8	411 109 2008	WASHER Y 3.1X8X0.5
MB-9	613 022 1797	SPRING,ACE HEAD
MB-10	613 144 5741	COMPL,BRACKET,HEAD
MB-11	613 110 1692	SLEEVE,ACE HEAD
MB-12	412 015 8207	SPECIAL NUT (M5)
MB-13	411 120 0007	SCR PAN+SW+W 2.6X5
MB-14	613 120 3631	BRACKET,STOPPER
MB-15	613 022 1582	SPRING,SLIDE BRAKE
MB-16	613 094 9240	COMPL,SLIDE,CAM
MB-17	613 022 1575	SPRING,LINK LOCK
MB-18	613 022 2725	DAMPER
MB-19	613 022 2534	GEAR,FRONT LOAD
MB-20	613 094 1206	ASSY,LEVER,FRONT
MB-21	613 134 2910	GEAR,HELICAL FRONT
MB-22	411 046 8002	SCR PAN+SW+W 2.6X6
MB-23	411 023 2801	SCR S-TPG PAN 2.6X6
MB-24	411 023 3303	SCR S-TPG PAN 2.6X8
OR	411 021 3107	SCR S-TPG BIN 2.6X8
MB-28	613 077 3227	HOLDER,WORM
MB-29	613 027 0382	WASHER
MB-30	613 078 8320	ASSY,WORM,FRONT
MB-31	613 117 0599	BRACKET,HOLDER
MB-32	613 093 9159	PLATE,NUT
MB-33	613 093 8374	DAMPER,MOTOR
MB-34	613 077 3616	DAMPER,WORM
MB-35	613 121 9960	ASSY,LOADING MOTOR
MB-36	613 092 9945	DAMPER,MOTOR
MB-37	613 132 8075	COMPL PCB,MC-3
MB-38	613 143 8439	COMPL PWB,MC-2
MB-39	613 110 0374	ROTARY SWITCH
MB-40	411 126 5303	SCR PAN 2.6X13
MB-41	613 092 9921	ASSY,SLIDE,FRONT
MB-42	613 092 5985	SPRING,LEVER LOAD
MB-43	613 092 5992	SPRING,LEVER ACT

LOCATION	PARTS NO.	DESCRIPTION
MB-44	613 092 5886	HOLDER,WORM
OR	613 138 8628	HOLDER,WORM
MB-45	613 027 0627	WASHER 2.1X6X0.5
MB-46	613 092 9938	ASSY,WORM,LOAD
MB-47	613 022 2985	BELT,LOADING
MB-48	412 033 4106	WASHER SLIT 2.6X5X0.50
MB-49	613 077 3579	GEAR,HELICAL
MB-50	613 102 9293	ASSY,LEVER,REV GUIDE
MB-51	613 022 1568	SPRING,REVIEW LEVER
MB-52	613 022 0158	COMPL,PINCH ROLLER
MB-53	613 147 9951	SPRING,PINCH ROLLER
MB-54	411 109 2107	WASHER Y 3.6X6X0.5
MB-55	613 078 8160	COMPL,LEVER,ACT BRAKE
MB-57	613 135 7655	PLATE,BGR
MB-58	613 145 5009	ASSY,MOUNTING,ROLLER S
MB-59	613 145 5016	ASSY,MOUNTING,ROLLER T
MB-60	411 063 0904	SCR SET HEX-SCT 2X3
MB-61	613 022 0233	ASSY,GUIDE,ROLLER
MB-63	645 000 2533	HEAD,FULL ERASE
MB-66	613 153 1871	LEVER,FE HEAD
MB-67	613 022 1698	SPRING,ERASE HEAD
MB-80	411 109 1803	WASHER Y 2.6X6X0.5
MB-81	613 119 8562	ASSY,ROLLER,CLEANER
MB-82	613 143 1881	ASSY,LEVER,CLEANER
MB-83	613 119 8593	SPRING
MB-84	613 142 9055	BRACKET,CLEANER
MB-90	613 144 4577	FLEXIBLE FLAT CABLE,CN811-CN303

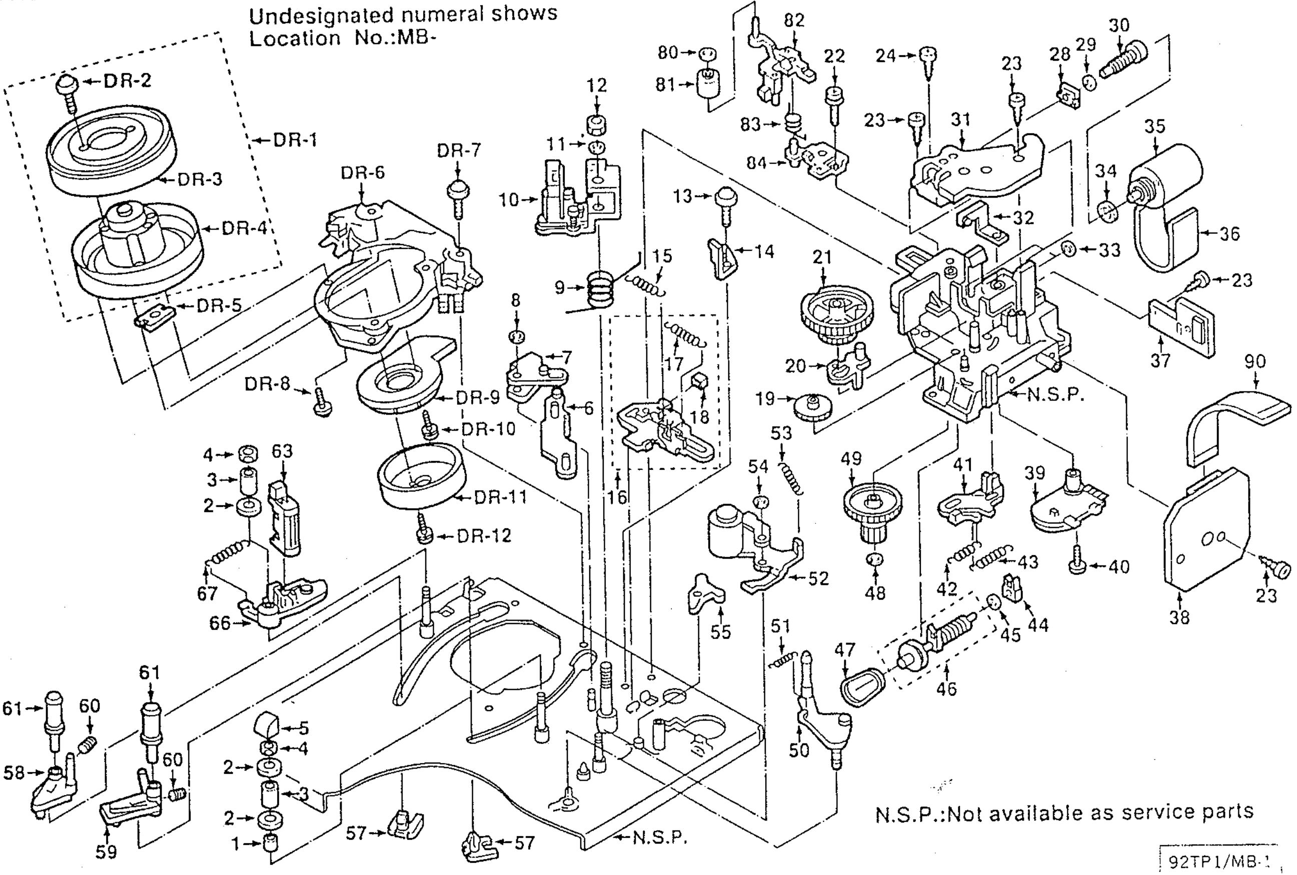
****

MECHANISM PARTS 2

LOCATION	PARTS NO.	DESCRIPTION
MC-1	645 000 5053	MOTOR,CAPSTAN DC 3W
MC-2	613 022 2978	BELT,REEL DRIVE
MC-3	613 135 4609	COMPL,LEVER,CLUTCH
MC-6	613 022 1520	SPRING,LEVER CLUTCH
MC-7	613 082 3434	LEVER,CHANGE CLUTCH
MC-8	613 022 1711	SPRING,CHANGE CLUTCH
MC-9	613 081 7518	ASSY,BRAKE CAPSTAN
MC-10	613 098 2285	SPRING,CAPSTAN
MC-12	411 021 3107	SCR S-TPG BIN 2.6X8
MC-13	411 109 2008	WASHER Y 3.1X8X0.5
MC-14	613 142 9093	SLIDE,CAM PLATE
MC-15	613 022 2701	CAM,MODE
MC-16	411 109 1902	WASHER Y 3.1X6X0.5
MC-17	613 135 7686	CAM,MAIN
MC-18	613 135 7532	ASSY,RACK,LOAD
MC-19	411 109 1803	WASHER Y 2.6X6X0.5
MC-20	613 135 7648	SPACER,RACK LOAD
MC-22	411 047 6809	SCR PAN+FLG 3X4
MC-23	613 021 9763	ASSY,EARTH,CYL
MC-24	613 135 7662	GEAR,LOAD TAKE UP
MC-25	613 022 1551	SPRING,GEAR LOAD T
MC-26	613 021 9879	ASSY,LEVER,LOAD T
MC-27	613 090 6373	GEAR,LOAD S
MC-28	613 022 1704	SPRING,GEAR LOAD S
MC-29	613 021 9862	ASSY,LEVER,LOAD S
MC-30	613 022 2039	LEVER,RETURN TENSION
MC-31	613 091 3104	ASSY,LEVER CONTROL
MC-34	411 028 6309	SCR S-TPG PAN 2.6X6
MC-35	412 015 8603	SPECIAL WASHER 3.1X6X0.25
MC-36	613 130 9890	ASSY,GEAR,FRICTION
MC-37	412 045 4606	SPECIAL WASHER 2.4X6X0.25
MC-38	411 092 0906	WASHER Z 2.6X10X0.5
MC-40	411 100 0300	SCR S-TPG BIN 2.6X5
MC-41	613 120 9060	COMPL,MC-1

MECHANISM PARTS 1

Undesignated numeral shows
Location No.:MB-

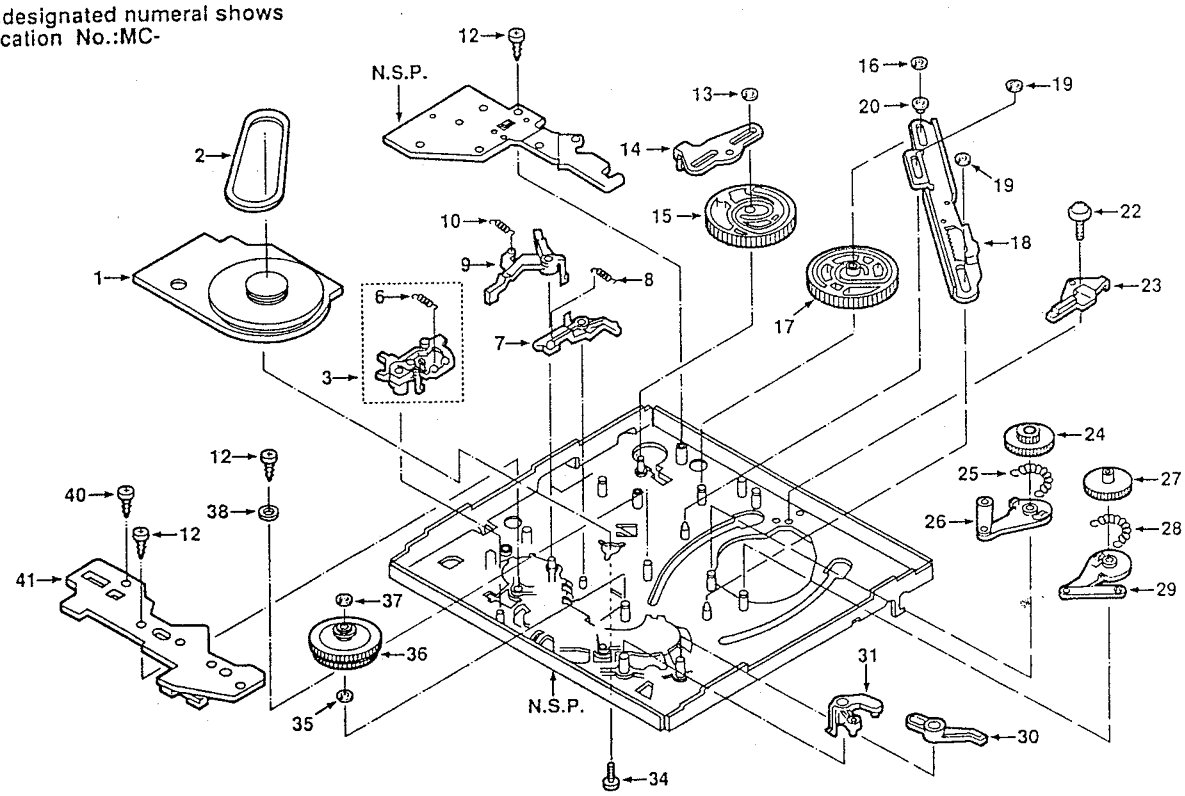

DR-1
DR-2
DR-3
DR-4
DR-5
DR-6
DR-7
DR-8
DR-9
DR-10
DR-11
DR-12
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
57
58
59
60
61
63
66
67
80
81
82
83
84
90
N.S.P.

N.S.P.:Not available as service parts

92TP1/MB-1

MECHANISM PARTS 2

Undesignated numeral shows
Location No.:MC-

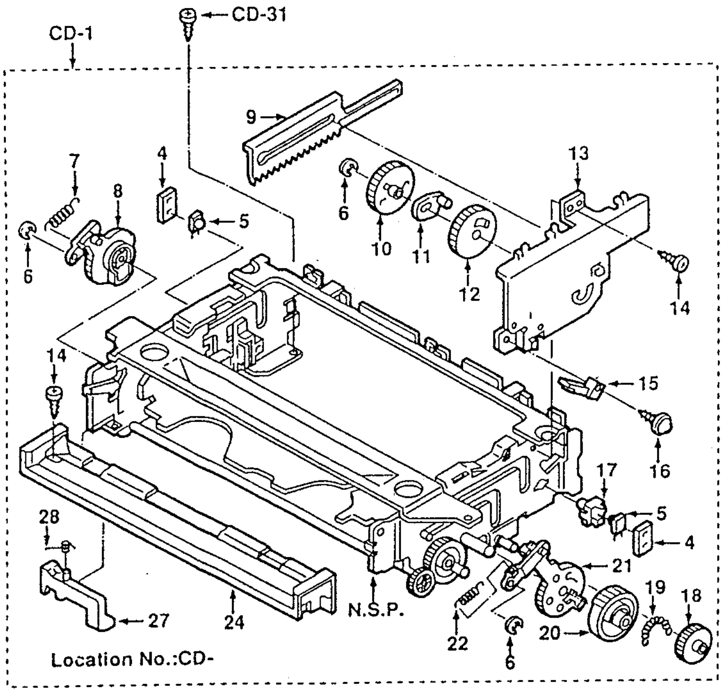

1
2
3
6
7
8
9
10
12
13
14
15
16
17
18
19
20
22
23
24
25
26
27
28
29
30
31
34
35
36
37
38
40
41
N.S.P.

93TP1/MC-1

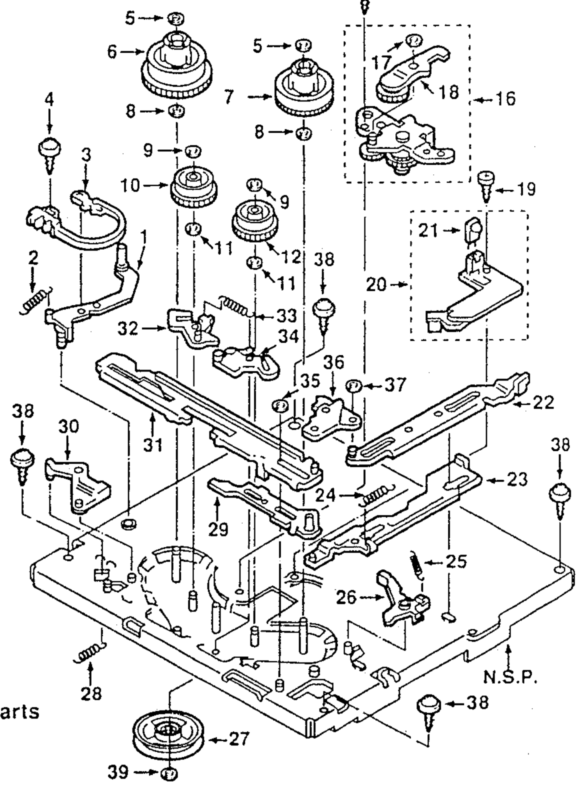
N.S.P.:Not available as service parts

MECHANISM PARTS 3

LOCATION	PARTS NO.	DESCRIPTION
CD-1	613 142 9581	COMPL.CASSETTE MECHANISM
CD-4	613 022 0585	LID
CD-5	407 098 3201	PHOTO COUPLE PN150SAN
CD-6	411 015 9801	RING E 2.3
CD-7	613 022 1643	SPRING,LINK L
CD-8	613 022 0073	ASSY,GEAR,LEVER L
CD-9	613 022 2695	RACK
CD-10	613 141 6109	GEAR,LOCK
CD-11	613 139 8962	ASSY,LEVER,PINION
CD-12	613 022 2626	GEAR,PINION
CD-13	613 021 9657	ASSY,BRACKET,GEAR
CD-14	411 027 1305	SCR S-TPG BIN 2.6X4
CD-15	613 095 0949	SW,SPECIAL
CD-16	411 106 9208	SCR PAN+SW+W 2X9
CD-17	613 022 0943	HOLDER,TRANSISTOR
CD-18	613 022 2619	GEAR,IDLER
CD-19	613 022 1667	SPRING,GEAR MAIN
CD-20	613 022 2596	GEAR,MAIN
CD-21	613 022 0097	ASSY,GEAR,LEVER R
CD-22	613 022 1674	SPRING,LINK R
CD-24	613 022 4064	BOARD,UNDER
CD-27	613 124 5006	LEVER,SAFETY SW
CD-28	613 125 6149	SPRING,SAFETY SW
CD-31	411 001 8702	SCR BIN 3X6
MA-1	613 100 0391	ASSY,LEVER,TENSION
MA-2	613 085 7996	SPRING,LEVER TENSION
MA-3	613 021 9701	ASSY,HOLDER,BAND
MA-4	411 144 2803	SCR PAN+SW+W 2.6X6
MA-5	411 109 1605	WASHER Y 2.6X6X0.25
MA-6	613 135 7068	ASSY,REEL,SUPPLY
OR	613 135 7549	ASSY,REEL,SUPPLY
MA-7	613 135 7075	ASSY,REEL,TAKE UP
OR	613 143 2963	ASSY,REEL,TAKE UP
MA-8	412 021 5306	SPECIAL WASHER 3.1X6X0.3
OR	412 015 8900	SPECIAL WASHER 3.1X6X0.4
OR	412 015 8504	SPECIAL WASHER 3.1X6X0.5
MA-9	411 109 1506	WASHER Y 2.1X6X0.25
OR	411 109 1407	WASHER Y 2.1X5X0.25
MA-10	613 135 7150	GEAR,REEL SUPPLY
OR	613 142 9116	GEAR,REEL SUPPLY
MA-11	412 026 7305	SPECIAL WASHER 2.6X6X0.25
MA-12	613 135 7167	GEAR,REEL TAKE UP
OR	613 142 9109	GEAR,REEL TAKE UP
MA-15	412 042 4302	SPECIAL SCREW 2.6X4
MA-16	613 135 7099	COMPL.IDLER,CLUTCH
MA-17	411 120 1301	WASHER Y 2.1X4X0.25
MA-18	613 135 7082	ASSY,IDLER
MA-19	411 021 3107	SCR S-TPG BIN 2.6X8
MA-20	613 120 9053	COMPL PCB,MC-4
MA-21	407 016 7205	LED LN59
MA-22	613 021 9985	ASSY,SLIDE,ACT PLATE
MA-23	613 142 9086	SLIDE,C BRAKE
MA-24	613 022 1612	SPRING,RETURN SLIDE
MA-25	613 022 1506	SPRING,SUB T
MA-26	613 098 0106	ASSY,BRAKE SUB T
MA-27	613 077 3647	PULLEY,REEL
MA-28	613 022 1490	SPRING,SUB SUPPLY
MA-29	613 022 2374	SLIDE,ACT BRAKE
MA-30	613 084 8871	BRAKE,SUB SUPPLY
MA-31	613 022 0004	ASSY,SLIDE,M PLATE
MA-32	613 080 9216	ASSY,BRAKE,SUPPLY
MA-33	613 086 2914	SPRING,MAIN BRAKE
MA-34	613 080 9209	ASSY,BRAKE,TAKE UP
MA-35	411 109 3005	WASHER Y 2.6X5X0.5
MA-36	613 022 2015	LEVER,CONT PLATE
MA-37	412 015 9501	SPECIAL WASHER
MA-38	411 021 7907	SCR S-TPG BIN 4X12
MA-39	412 045 4606	SPECIAL WASHER 2.4X6X0.25



Undesignated numeral shows
Location No.:MA-



N.S.P.:Not available as service parts

ELECTRICAL PARTS

NOTE;

1. Materials of Capacitors and Resistors are abbreviated as follows;

Resistors	
MT-FILM	Metallized Film Resistor
MT-GLAZE	Metallized Glaze Resistor
OXIDE-MT	Oxide Metallized Film Resistor
Capacitors	
MT-POLYEST	Metallized Polyester Capacitor
MT-COMPO	Metallized Composite Capacitor
TA-SOLID	Tantalum Solid Capacitor
AL-SOLID	Aluminum Solid Capacitor
NP-ELECT	Non-Polarized Electrolytic Capacitor
OS-SOLID	Aluminum Solid Capacitors with Organic Semiconductive Electrolytic Capacitor
DL-ELECT	Double Layered Electrolytic Capacitor

2. Tolerance of Capacitor(10pF over) and Resistor are noted with follow symboles.
   F …………±1%　G …………±2%　J …………±5%　K …………±10%
   M …………±20%　N …………±30%　Z …………+80% ~ −20%
3. Capacitors
   U : uF　P : pF
4. Inductors
   UH : uH　MH : mH
5. N.S.P. : Not available as service parts.

LOCATION	PARTS NO.	DESCRIPTION
COMPL PWB,CP-1-A		
COMPL.NO	613 154 4895	
(SEMICONDUCTORS)		
Q1002	405 057 6201	TR 2SC4038-Q
OR	405 057 6409	TR 2SC4038-R
OR	405 123 7002	TR 2SD1991A-Q
OR	405 123 7101	TR 2SD1991A-R
Q1003	405 064 0100	TR 2SA1561-Q
OR	405 064 0209	TR 2SA1561-R
OR	405 123 6708	TR 2SB1320A-Q
OR	405 123 6807	TR 2SB1320A-R
Q1004	405 064 0100	TR 2SA1561-Q
OR	405 064 0209	TR 2SA1561-R
OR	405 123 6708	TR 2SB1320A-Q
OR	405 123 6807	TR 2SB1320A-R
Q1006	405 057 6201	TR 2SC4038-Q
OR	405 057 6409	TR 2SC4038-R
OR	405 123 7002	TR 2SD1991A-Q
OR	405 123 7101	TR 2SD1991A-R
Q1007	405 057 6201	TR 2SC4038-Q
OR	405 057 6409	TR 2SC4038-R
OR	405 123 7002	TR 2SD1991A-Q
OR	405 123 7101	TR 2SD1991A-R
Q1010	405 064 0100	TR 2SA1561-Q
OR	405 064 0209	TR 2SA1561-R
OR	405 123 6708	TR 2SB1320A-Q
OR	405 123 6807	TR 2SB1320A-R
Q1011	405 063 9708	TR DTC144EL
OR	405 123 6500	TR UN6213
Q1012	405 057 6201	TR 2SC4038-Q
OR	405 057 6409	TR 2SC4038-R
OR	405 123 7002	TR 2SD1991A-Q
OR	405 123 7101	TR 2SD1991A-R
Q1013	405 063 9708	TR DTC144EL
OR	405 123 6500	TR UN6213
Q1014	405 057 6201	TR 2SC4038-Q
OR	405 057 6409	TR 2SC4038-R
OR	405 123 7002	TR 2SD1991A-Q
OR	405 123 7101	TR 2SD1991A-R
Q1101	405 064 0100	TR 2SA1561-Q
OR	405 064 0209	TR 2SA1561-R
OR	405 123 6708	TR 2SB1320A-Q
OR	405 123 6807	TR 2SB1320A-R
Q1102	405 057 6201	TR 2SC4038-Q
Q1102	405 057 6409	TR 2SC4038-R
OR	405 123 7002	TR 2SD1991A-Q
OR	405 123 7101	TR 2SD1991A-R
Q1151	405 063 9906	TR DTC124EL
OR	405 123 6401	TR UN6212
Q1152	405 064 0100	TR 2SA1561-Q
OR	405 064 0209	TR 2SA1561-R
OR	405 123 6708	TR 2SB1320A-Q
OR	405 123 6807	TR 2SB1320A-R
Q1312	405 057 6201	TR 2SC4038-Q
OR	405 057 6409	TR 2SC4038-R
OR	405 123 7002	TR 2SD1991A-Q
OR	405 123 7101	TR 2SD1991A-R
Q1313	405 063 9708	TR DTC144EL
OR	405 123 6500	TR UN6213
Q1601	405 004 4601	TR 2SA608-F-SPA
OR	405 006 1806	TR 2SA933S-R
Q1653	405 057 6201	TR 2SC4038-Q
OR	405 057 6409	TR 2SC4038-R
OR	405 123 7002	TR 2SD1991A-Q
OR	405 123 7101	TR 2SD1991A-R
Q1654	405 064 0100	TR 2SA1561-Q
OR	405 064 0209	TR 2SA1561-R
OR	405 123 6708	TR 2SB1320A-Q
OR	405 123 6807	TR 2SB1320A-R
Q2001	405 024 9709	TR 2SD734-E
OR	405 024 9907	TR 2SD734-F
Q2002	405 063 9708	TR DTC144EL
OR	405 123 6500	TR UN6213
Q2003	405 003 7702	TR 2SA1346
OR	405 000 1208	TR DTA124ES
Q3001	405 018 2808	TR 2SC3402
OR	405 000 3103	TR DTC114ES
Q3002	405 018 2808	TR 2SC3402
OR	405 000 3103	TR DTC114ES
Q3201	405 019 2005	TR 2SC536-E-SPA
OR	405 019 2807	TR 2SC536-F-SPA
OR	405 011 8401	TR 2SC1740S-Q
OR	405 011 8500	TR 2SC1740S-R
OR	405 093 0607	TR KSC2785-Y
Q3202	405 019 2005	TR 2SC536-E-SPA
OR	405 019 2807	TR 2SC536-F-SPA
OR	405 011 8401	TR 2SC1740S-Q

LOCATION	PARTS NO.	DESCRIPTION
Q3202	405 011 8500	TR 2SC1740S-R
OR	405 093 0607	TR KSC2785-Y
Q3203	405 004 4007	TR 2SA608-E-SPA
OR	405 004 4601	TR 2SA608-F-SPA
OR	405 006 1707	TR 2SA933S-Q
OR	405 006 1806	TR 2SA933S-R
OR	405 093 0508	TR KSA1175-Y
Q3504	405 063 9708	TR DTC144EL
OR	405 123 6500	TR UN6213
Q3553	405 057 6201	TR 2SC4038-Q
OR	405 057 6409	TR 2SC4038-R
OR	405 123 7002	TR 2SD1991A-Q
OR	405 123 7101	TR 2SD1991A-R
Q5101	405 088 9103	TR 2SA1703-S
OR	405 108 7003	TR 2SB1322A-S
OR	405 108 6907	TR 2SB1322A-R
Q5102	405 089 2103	TR 2SC4483-S
OR	405 107 4201	TR 2SD1994-S
OR	405 107 4102	TR 2SD1994-R
Q5103	405 018 2808	TR 2SC3402
OR	405 000 3103	TR DTC114ES
Q6001	405 026 9004	TR 2SK222-D
OR	405 026 9103	TR 2SK222-E
OR	405 114 7806	TR 2SK1104-P
OR	405 114 7905	TR 2SK1104-Q
OR	405 114 8001	TR 2SK1104-R
OR	405 073 6407	TR 2SK772-E
OR	405 073 6506	TR 2SK772-F
Q6002	405 004 4007	TR 2SA608-E-SPA
OR	405 004 4601	TR 2SA608-F-SPA
OR	405 006 1707	TR 2SA933S-Q
OR	405 006 1806	TR 2SA933S-R
OR	405 093 0508	TR KSA1175-Y
Q6004	405 019 2005	TR 2SC536-E-SPA
OR	405 019 2807	TR 2SC536-F-SPA
OR	405 093 0607	TR KSC2785-Y
OR	405 011 8401	TR 2SC1740S-Q
OR	405 011 8500	TR 2SC1740S-R
Q6611	405 004 4007	TR 2SA608-E-SPA
OR	405 004 4601	TR 2SA608-F-SPA
OR	405 006 1707	TR 2SA933S-Q
OR	405 006 1806	TR 2SA933S-R
OR	405 093 0508	TR KSA1175-Y
Q6621	405 019 2005	TR 2SC536-E-SPA
OR	405 019 2807	TR 2SC536-F-SPA
OR	405 093 0607	TR KSC2785-Y
OR	405 011 8401	TR 2SC1740S-Q
OR	405 011 8500	TR 2SC1740S-R
Q6901	405 019 2005	TR 2SC536-E-SPA
OR	405 019 2807	TR 2SC536-F-SPA
OR	405 093 0607	TR KSC2785-Y
OR	405 011 8401	TR 2SC1740S-Q
OR	405 011 8500	TR 2SC1740S-R
Q6902	405 004 4007	TR 2SA608-E-SPA
OR	405 004 4601	TR 2SA608-F-SPA
OR	405 006 1707	TR 2SA933S-Q
OR	405 006 1806	TR 2SA933S-R
OR	405 093 0508	TR KSA1175-Y
Q6903	405 019 2005	TR 2SC536-E-SPA
OR	405 019 2807	TR 2SC536-F-SPA
OR	405 093 0607	TR KSC2785-Y
OR	405 011 8401	TR 2SC1740S-Q
OR	405 011 8500	TR 2SC1740S-R
Q6904	405 063 9708	TR DTC144EL
OR	405 123 6500	TR UN6213
Q6921	405 084 8209	TR 2SC2960-F-SPA

LOCATION	PARTS NO.	DESCRIPTION
Q6921	405 084 8308	TR 2SC2960-G-SPA
(INTEGRATED CIRCUITS)		
IC101	409 303 6700	IC LA7345M
OR	409 326 0204	IC LA7345AM
OR	409 333 9900	IC LA7345AM
IC111	409 297 6205	IC LC89925
IC161	409 003 4501	IC BA7021
OR	409 120 3401	IC LA7221
IC201	409 262 2409	IC LA7285M
IC301	410 185 5408	IC LC866648V-5457
OR	410 178 8300	IC LC866648V-5420
IC302	409 114 4803	IC LB1641
IC303	409 313 0903	IC MN1381-L
OR	409 243 4101	IC MN1380-L
IC321	410 166 2808	IC LC74760M-8783
IC351	409 306 0408	IC XRU2890BK
OR	409 306 0507	IC BU2890BK
OR	409 311 9601	IC BU2890DK
IC501	409 297 7509	IC STR-M6549
IC511	409 067 7203	IC L5431
IC512	409 297 7400	IC PQ12SZ11
IC601	409 026 8203	IC L5631
OR	409 057 5103	IC UPC574J
IC602	409 283 6905	IC LE24C04S1
OR	410 172 6906	IC X24C04P-C7346
IC691	409 019 6209	IC LA7910
(DIODES)		
D1003	407 007 9904	DIODE GMA01
OR	407 012 4406	DIODE 1SS133
D1007	407 007 9904	DIODE GMA01
OR	407 012 4406	DIODE 1SS133
D1601	407 007 9904	DIODE GMA01
OR	407 012 4406	DIODE 1SS133
D1602	407 007 9904	DIODE GMA01
OR	407 012 4406	DIODE 1SS133
D1611	407 070 7104	ZENER DIODE GZS5.6X
OR	407 053 6704	ZENER DIODE MTZ5.6B
D1671	407 007 9904	DIODE GMA01
OR	407 012 4406	DIODE 1SS133
D3001	407 150 7703	DIODE RB441Q
D3002	407 051 6904	ZENER DIODE GZS5.6Y
OR	407 099 5303	ZENER DIODE MTZJ5.6B
D3003	407 070 8101	ZENER DIODE GZS8.2Y
OR	407 063 9504	ZENER DIODE MTZJ8.2B
D3107	407 012 4406	DIODE 1SS133
OR	407 007 9904	DIODE GMA01
D3121	407 012 4406	DIODE 1SS133
OR	407 007 9904	DIODE GMA01
D3122	407 012 4406	DIODE 1SS133
OR	407 007 9904	DIODE GMA01
D3123	407 012 4406	DIODE 1SS133
OR	407 007 9904	DIODE GMA01
D3201	407 012 4406	DIODE 1SS133
OR	407 007 9904	DIODE GMA01
D3202	407 012 4406	DIODE 1SS133
OR	407 007 9904	DIODE GMA01
D3502	407 007 9904	DIODE GMA01
OR	407 012 4406	DIODE 1SS133
D5001	407 134 8900	DIODE DBC10G

LOCATION	PARTS NO.	DESCRIPTION
D5003	407 091 6704	DIODE AP01C
D5004	407 078 2705	DIODE 1SS244
D5011 ⚠	407 151 3308	PHOTO COUPLE PC120FB
D5101	407 129 2005	DIODE RL2Z-LF-B1
D5102	407 158 1505	DIODE ERC30-02L38
D5103	407 100 6909	DIODE AG01
OR	407 091 6902	DIODE ERA38-04
D5104	407 078 2705	DIODE 1SS244
D5105	407 100 6909	DIODE AG01
OR	407 091 6902	DIODE ERA38-04
D5109	407 099 5105	ZENER DIODE MTZJ4.7B
D5110	407 120 5807	DIODE AK04
D5111	407 007 9904	DIODE GMA01
OR	407 012 4406	DIODE 1SS133
D5112	407 063 8705	ZENER DIODE MTZJ5.1C
D5113	407 004 9709	DIODE DSK10C
OR	407 005 8701	DIODE ERA15-02
D5114	407 078 2705	DIODE 1SS244
D6601	407 070 7104	ZENER DIODE GZS5.6X
OR	407 053 6704	ZENER DIODE MTZ5.6B
D6901	407 012 4406	DIODE 1SS133
OR	407 007 9904	DIODE GMA01
D6902	407 012 4406	DIODE 1SS133
OR	407 007 9904	DIODE GMA01
D6903	407 012 4406	DIODE 1SS133
OR	407 007 9904	DIODE GMA01
(CRYSTAL DEVICES)		
X1001	645 000 6012	OSC,CRYSTAL 4.433619MHZ
OR	645 000 6029	OSC,CRYSTAL 4.433619MHZ
OR	645 002 4436	OSC,CRYSTAL 4.433619MHZ
X3001	613 132 8242	RESONATOR,CERAMIC13.92MHZ
X3002	613 109 0972	OSC,CRYSTAL 32KHZ
OR	613 123 6387	OSC,CRYSTAL 32.768KHZ
X3201	613 002 8709	CRYSTAL 17.734475MHZ
OR	613 127 1555	OSC,CRYSTAL 17.734475MHZ
(VARIABLE RESISTORS)		
VR101	613 120 8438	VR,SEMI 22KB
OR	613 120 8582	VR,SEMI 22KB
VR102	613 120 8421	VR,SEMI 2.2KB
OR	613 120 8575	VR,SEMI 2.2KB
VR103	613 120 8506	VR,SEMI 4.7KB
OR	613 120 8650	VR,SEMI 4.7KB
VR104	613 079 2532	VR,SEMI 10KB
OR	613 120 8544	VR,SEMI 10KB
VR201	613 097 7915	VR,SEMI 100KB
OR	613 001 9097	SEMI VR 100KB
VR351	613 097 7953	VR,SEMI 220KB
OR	613 001 9110	SEMI VR 220KB
(TRIMMER)		
CT321	613 002 6378	TRIMMER
(INDUCTORS)		
L1001	613 014 1156	COIL,INDUCTOR 39UHJ
OR	613 014 4676	HF CHOKE 39UHJ
L1002	613 014 0739	COIL,INDUCTOR 1.0UHK
OR	613 014 4256	HF CHOKE 1.0UHM
L1004	613 014 0999	COIL,INDUCTOR 150UHK
OR	613 014 4515	HF CHOKE 150UHK
L1005	613 014 1019	COIL,INDUCTOR 220UHK
OR	613 014 4539	HF CHOKE 220UHK
L1007	613 014 0791	COIL,INDUCTOR 3.3UHK
OR	613 014 4317	HF CHOKE 3.3UHK

LOCATION	PARTS NO.	DESCRIPTION
L1008	613 014 0876	COIL,INDUCTOR 15UHK
OR	613 014 4393	HF CHOKE 15UHK
L1009	613 014 0777	COIL,INDUCTOR 2.2UHK
OR	613 014 4294	HF CHOKE 2.2UHM
L1010	613 014 0906	COIL,INDUCTOR 27UHK
OR	613 014 4423	HF CHOKE 27UHK
L1012	613 014 1156	COIL,INDUCTOR 39UHJ
OR	613 014 4676	HF CHOKE 39UHJ
L1013	613 014 0913	COIL,INDUCTOR 33UHK
OR	613 014 4430	HF CHOKE 33UHK
L1081	613 014 0975	COIL,INDUCTOR 100UHK
OR	613 014 4492	HF CHOKE 003
L1101	613 014 0968	COIL,INDUCTOR 82UHK
OR	613 014 4485	HF CHOKE 82UHK
L2002	613 014 3532	HF CHOKE 10000UHJ
L2003	613 015 6297	COIL,INDUCTOR 560UHJ
L2051	613 130 3539	FERRITE CORE
OR	613 017 0316	CORE
L3001	645 002 3675	LINE FILTER
L3002	645 002 3675	LINE FILTER
L3201	613 014 1057	COIL,INDUCTOR 5.6UHJ
OR	613 014 4577	HF CHOKE 5.6UHJ
L5001 ⚠	613 080 0664	LF CHOKE
OR ⚠	613 119 9828	COIL,LINE FILTER
L5002 ⚠	645 002 1886	LINE FILTER
L5003	613 107 6884	FERRITE CORE
L5004	613 017 0354	CORE
L5101	645 002 4122	INDUCTOR,10U K
OR	613 110 4198	COIL,INDUCTOR 10UH K
L5102	645 002 4962	INDUCTOR,22U K
OR	613 145 4262	COIL,INDUCTOR 22UH K
L6002	613 014 0852	COIL,INDUCTOR 10UHK
OR	613 014 4379	HF CHOKE 10UHK
L6003	613 014 0852	COIL,INDUCTOR 10UHK
OR	613 014 4379	HF CHOKE 10UHK
L6004	613 014 0852	COIL,INDUCTOR 10UHK
OR	613 014 4379	HF CHOKE 10UHK
L6005	613 014 0852	COIL,INDUCTOR 10UHK
OR	613 014 4379	HF CHOKE 10UHK
L6601	613 014 0739	COIL,INDUCTOR 1.0UHK
OR	613 014 4256	HF CHOKE 1.0UHM
L6603	613 014 0852	COIL,INDUCTOR 10UHK
OR	613 014 4379	HF CHOKE 10UHK
L6621	613 014 0975	COIL,INDUCTOR 100UHK
OR	613 014 4492	HF CHOKE 003
(TRANSFORMERS)		
T2001	613 094 3378	TRANS,OSC 70KHZ
OR	613 016 2205	OSC COIL 70KHZ
T5001 ⚠	645 000 9730	TRANS,POWER,PULSE
T6901	613 109 0958	TRANS,IF
OR	613 109 0965	TRANS,IF
(DELAY LINES)		
DL101	645 000 5992	DELAY LINE(COMB)
OR	645 000 6005	DELAY LINE(COMB)

(CAPACITORS)				
C1001	403 017 9705	CERAMIC	22P J	50V
C1002	403 071 5408	CERAMIC	220P J	50V
C1003	403 030 6309	CERAMIC	68P J	50V
C1004	403 022 7703	CERAMIC	33P J	50V
C1005	403 139 2608	ELECT	0.47U M	50V

LOCATION	PARTS NO.	DESCRIPTION		
C1006	403 025 7304	CERAMIC	4.7P K	50V
C1007	403 073 2702	CERAMIC	390P J	50V
C1009	403 025 7304	CERAMIC	4.7P K	50V
C1010	403 075 3103	CERAMIC	82P J	50V
C1011	403 139 2707	ELECT	1U M	50V
C1012	403 139 1502	ELECT	10U M	16V
C1013	403 139 2608	ELECT	0.47U M	50V
C1014	403 001 1906	CERAMIC	0.01U M	16V
C1015	403 120 9005	CERAMIC	0.022U J	16V
C1016	403 120 9005	CERAMIC	0.022U J	16V
C1021	403 073 2702	CERAMIC	390P J	50V
C1022	403 217 5507	CERAMIC	0.1U J	16V
C1023	403 030 6309	CERAMIC	68P J	50V
C1027	403 001 1906	CERAMIC	0.01U M	16V
C1029	403 139 1502	ELECT	10U M	16V
C1030	403 191 8709	ELECT	1U M	50V
C1031	403 191 8709	ELECT	1U M	50V
C1032	403 120 9609	CERAMIC	0.047U J	16V
C1033	403 120 9005	CERAMIC	0.022U J	16V
C1034	403 075 2601	CERAMIC	75P J	50V
C1036	403 191 8709	ELECT	1U M	50V
C1037	403 191 8808	ELECT	2.2U M	50V
C1038	403 120 9005	CERAMIC	0.022U J	16V
C1039	403 120 9609	CERAMIC	0.047U J	16V
C1040	403 001 1906	CERAMIC	0.01U M	16V
C1041	403 189 2405	ELECT	10U M	16V
C1042	403 120 9609	CERAMIC	0.047U J	16V
C1043	403 222 1105	CERAMIC	0.047U Z	16V
C1044	403 163 7907	ELECT	47U M	6.3V
C1045	403 001 1906	CERAMIC	0.01U M	16V
C1046	403 139 1502	ELECT	10U M	16V
C1047	403 139 1502	ELECT	10U M	16V
C1048	403 001 1906	CERAMIC	0.01U M	16V
C1049	403 022 7703	CERAMIC	33P J	50V
C1050	403 001 1906	CERAMIC	0.01U M	16V
C1051	403 073 6205	CERAMIC	470P J	50V
C1052	403 001 1906	CERAMIC	0.01U M	16V
C1053	403 001 1906	CERAMIC	0.01U M	16V
C1054	403 139 1007	ELECT	47U M	6.3V
C1058	403 019 9703	CERAMIC	27P J	50V
C1060	403 022 7703	CERAMIC	33P J	50V
C1061	403 022 7703	CERAMIC	33P J	50V
C1062	403 071 1509	CERAMIC	180P J	50V
C1081	403 074 8703	CERAMIC	680P J	50V
C1092	403 068 9402	CERAMIC	100P K	50V
C1101	403 139 1007	ELECT	47U M	6.3V
C1102	403 001 1906	CERAMIC	0.01U M	16V
C1105	403 026 2209	CERAMIC	47P J	50V
C1106	403 025 7304	CERAMIC	4.7P K	50V
C1107	403 026 2209	CERAMIC	47P J	50V
C1109	403 001 1906	CERAMIC	0.01U M	16V
C1110	403 139 2707	ELECT	1U M	50V
C1311	403 121 9509	CERAMIC	0.1U Z	50V
C1601	403 121 9509	CERAMIC	0.1U Z	50V
C1602	403 223 9308	ELECT	470U M	6.3V
C1611	403 193 8608	ELECT	0.47U M	50V
C1612	403 026 2209	CERAMIC	47P J	50V
C1613	403 121 9509	CERAMIC	0.1U Z	50V
C1614	403 139 1502	ELECT	10U M	16V
C2002	403 075 4506	CERAMIC	820P K	50V
C2004	403 139 0901	ELECT	33U M	6.3V
C2005	403 150 0201	CERAMIC	0.018U K	16V
C2009	403 150 6500	ELECT	22U M	16V
C2010	403 139 1809	ELECT	47U M	16V
C2013	403 002 8201	CERAMIC	0.015U J	25V
C2016	403 191 8600	ELECT	4.7U M	25V
C2017	403 139 1502	ELECT	10U M	16V
C2019	403 139 1809	ELECT	47U M	16V

LOCATION	PARTS NO.	DESCRIPTION		
C2020	403 071 6207	CERAMIC	220P K	50V
C2021	403 081 7409	POLYPRO	0.033U J	100V
C2022	403 129 0409	CERAMIC	0.01U K	16V
C2024	403 129 0409	CERAMIC	0.01U K	16V
C2051	403 070 4105	CERAMIC	120P K	50V
C2091	403 121 9509	CERAMIC	0.1U Z	50V
C2092	403 001 5102	CERAMIC	2200P M	16V
C2101	403 121 9509	CERAMIC	0.1U Z	50V
C2102	403 121 9509	CERAMIC	0.1U Z	50V
C2152	403 069 1207	CERAMIC	1000P K	50V
C2153	403 001 8905	CERAMIC	6800P M	16V
C3001	403 191 8808	ELECT	2.2U M	50V
C3002	403 001 1906	CERAMIC	0.01U M	16V
C3003	403 121 9509	CERAMIC	0.1U Z	50V
C3004	403 001 1906	CERAMIC	0.01U M	16V
C3005	403 001 1906	CERAMIC	0.01U M	16V
C3008	403 189 2405	ELECT	10U M	16V
C3009	403 001 1906	CERAMIC	0.01U M	16V
C3010	403 009 1700	CERAMIC	10P J	50V
C3011	403 017 0108	CERAMIC	20P J	50V
C3012	403 001 1906	CERAMIC	0.01U M	16V
C3013	403 121 9509	CERAMIC	0.1U Z	50V
C3015	403 121 9509	CERAMIC	0.1U Z	50V
C3016	403 001 1906	CERAMIC	0.01U M	16V
C3017	403 223 9308	ELECT	470U M	6.3V
C3019	403 121 9509	CERAMIC	0.1U Z	50V
C3020	403 069 1207	CERAMIC	1000P K	50V
C3021	403 026 2209	CERAMIC	47P J	50V
C3022	403 265 4408	DL-ELECT	0.1F Z	5.5V
C3023	403 010 7708	CERAMIC	12P J	50V
C3201	403 012 6006	CERAMIC	15P J	50V
C3202	403 012 6006	CERAMIC	15P J	50V
C3203	403 139 2707	ELECT	1U M	50V
C3204	403 009 1700	CERAMIC	10P J	50V
C3205	403 019 0403	CERAMIC	24P J	50V
C3206	403 138 2500	CERAMIC	0.022U K	16V
C3207	403 119 7104	CERAMIC	6800P K	16V
C3208	403 086 2805	NP-ELECT	1U M	50V
C3211	403 191 8709	ELECT	1U M	50V
C3212	403 068 9402	CERAMIC	100P K	50V
C3213	403 163 7907	ELECT	47U M	6.3V
C3214	403 189 2405	ELECT	10U M	16V
C3216	403 139 1007	ELECT	47U M	6.3V
C3217	403 001 1906	CERAMIC	0.01U M	16V
C3501	403 129 9709	CERAMIC	0.015U K	16V
C3502	403 001 8806	CERAMIC	6800P K	16V
C3503	403 129 9709	CERAMIC	0.015U K	16V
C3505	403 150 6500	ELECT	22U M	16V
C3506	403 001 8806	CERAMIC	6800P K	16V
C3508	403 150 6500	ELECT	22U M	16V
C3511	403 071 6207	CERAMIC	220P K	50V
C3512	403 184 9201	MT-POLYEST	0.039U J	50V
C3513	403 119 6701	CERAMIC	0.068U K	16V
C3514	403 057 2902	POLYESTER	0.1U K	50V
C3515	403 059 6007	POLYESTER	0.022U K	50V
C3516	403 001 5003	CERAMIC	2200P K	16V
C3517	403 001 3801	CERAMIC	1500P K	16V
C3522	403 069 1207	CERAMIC	1000P K	50V
C3523	403 191 8709	ELECT	1U M	50V
C3524	403 001 1906	CERAMIC	0.01U M	16V
C3525	403 193 8608	ELECT	0.47U M	50V
C3526	403 138 2500	CERAMIC	0.022U K	16V
C3530	403 163 7907	ELECT	47U M	6.3V
C3536	403 193 7601	ELECT	220U M	6.3V
C3540	403 068 9402	CERAMIC	100P K	50V
C3551	403 175 0903	MT-POLYEST	0.12U J	50V
C3552	403 028 3402	CERAMIC	56P J	50V

LOCATION	PARTS NO.	DESCRIPTION			
C3553	403 191 8709	ELECT	1U	M	50V
C3554	403 070 7205	CERAMIC	150P	J	50V
C3556	403 069 1207	CERAMIC	1000P	K	50V
C3558	403 149 0700	ELECT	33U	M	16V
C3570	403 121 9509	CERAMIC	0.1U	Z	50V
C5001 ⚠	404 055 5001	MT-POLYEST	0.22U	M	250V
C5002 ⚠	404 055 4905	MT-POLYEST	0.068U	M	250V
C5003	403 238 1809	ELECT	47U	M	400V
C5004	403 243 9203	ELECT	2.2U	M	250V
C5005	403 255 8409	CERAMIC	39P	J	1K
C5006	403 157 0105	ELECT	10U	M	35V
C5020 ⚠	404 032 8506	CERAMIC	1000P	M	400V
C5022 ⚠	404 032 8506	CERAMIC	1000P	M	400V
C5101	403 204 6401	ELECT	1000U	M	16V
C5102	403 148 0305	ELECT	470U	M	16V
C5103 ⚠	403 075 7101	CERAMIC	1000P	M	500V
C5104	403 243 8909	ELECT	1000U	M	10V
C5105	403 147 9507	ELECT	470U	M	6.3V
C5106	403 154 8302	ELECT	47U	M	50V
C5107	403 155 3009	ELECT	47U	M	25V
C5108	403 155 5409	ELECT	220U	M	6.3V
C5110	403 184 9300	MT-POLYEST	0.047U	J	50V
C5111	403 121 9509	CERAMIC	0.1U	Z	50V
C5112	403 126 4509	ELECT	100U	M	16V
C5113	403 001 1906	CERAMIC	0.01U	M	16V
C5114	403 135 4002	ELECT	47U	M	6.3V
C5116	403 076 0200	CERAMIC	200P	K	500V
C6001	403 121 9509	CERAMIC	0.1U	Z	50V
C6002	403 191 8600	ELECT	4.7U	M	25V
C6003	403 191 8709	ELECT	1U	M	50V
C6004	403 168 6103	MT-POLYEST	0.1U	J	50V
C6005	403 191 8600	ELECT	4.7U	M	25V
C6006	403 248 1608	ELECT	47U	M	16V
C6007	403 222 1105	CERAMIC	0.047U	Z	16V
C6009	403 193 8905	ELECT	22U	M	50V
C6010	403 121 9509	CERAMIC	0.1U	Z	50V
C6017	403 073 7004	CERAMIC	470P	K	50V
C6601	403 189 2405	ELECT	10U	M	16V
C6602	403 189 2405	ELECT	10U	M	16V
C6611	403 150 6500	ELECT	22U	M	16V
C6621	403 022 7703	CERAMIC	33P	J	50V
C6622	403 024 1501	CERAMIC	39P	J	50V
C6901	403 121 9509	CERAMIC	0.1U	Z	50V
C6902	403 189 2405	ELECT	10U	M	16V
C6903	403 003 3700	CERAMIC	0.022U	Z	25V
C6904	403 258 3807	ELECT	0.22U	M	50V
C6921	403 121 9509	CERAMIC	0.1U	Z	50V
C6924	403 168 6202	MT-POLYEST	0.33U	J	50V
C6925	403 184 9805	MT-POLYEST	0.22U	J	50V
C6926	403 233 0302	ELECT	100U	M	16V
C6927	403 071 2001	CERAMIC	180P	K	50V
(RESISTORS)					
R1001	401 018 3708	CARBON	3.3K	JA	1/4W
R1002	401 013 5202	CARBON	1.2K	JA	1/4W
R1003	401 019 1802	CARBON	3.9K	JA	1/4W
R1004	401 012 5609	CARBON	1K	JA	1/4W
R1005	401 019 0904	CARBON	390	JA	1/4W
R1006	401 023 1607	CARBON	820	JA	1/4W
R1007	401 012 5609	CARBON	1K	JA	1/4W
R1008	401 017 1705	CARBON	2.7K	JA	1/4W
R1009	401 022 1806	CARBON	680	JA	1/4W
R1012	401 012 5609	CARBON	1K	JA	1/4W
R1013	401 012 5609	CARBON	1K	JA	1/4W
R1014	401 016 3700	CARBON	2.2K	JA	1/4W
R1018	401 012 5609	CARBON	1K	JA	1/4W
R1019	401 016 4707	CARBON	22K	JA	1/4W

LOCATION	PARTS NO.	DESCRIPTION			
R1020	401 016 4707	CARBON	22K	JA	1/4W
R1021	401 012 5609	CARBON	1K	JA	1/4W
R1022	401 012 5609	CARBON	1K	JA	1/4W
R1023	401 012 5609	CARBON	1K	JA	1/4W
R1026	401 012 9201	CARBON	1M	JA	1/4W
R1027	401 023 2703	CARBON	8.2K	JA	1/4W
R1028	401 015 2605	CARBON	1.8K	JA	1/4W
R1029	401 012 5609	CARBON	1K	JA	1/4W
R1032	401 016 4707	CARBON	22K	JA	1/4W
R1033	401 012 5609	CARBON	1K	JA	1/4W
R1035	401 020 0702	CARBON	470	JA	1/4W
R1036	401 014 4006	CARBON	1.5K	JA	1/4W
R1038	401 012 5609	CARBON	1K	JA	1/4W
R1040	401 014 2804	CARBON	150	JA	1/4W
R1041	401 012 4404	CARBON	100	JA	1/4W
R1042	401 012 5609	CARBON	1K	JA	1/4W
R1044	401 013 6308	CARBON	12K	JA	1/4W
R1046	401 018 4804	CARBON	33K	JA	1/4W
R1047	401 023 2703	CARBON	8.2K	JA	1/4W
R1048	401 020 1907	CARBON	4.7K	JA	1/4W
R1049	401 013 6308	CARBON	12K	JA	1/4W
R1052	401 012 5609	CARBON	1K	JA	1/4W
R1053	401 018 2701	CARBON	330	JA	1/4W
R1054	401 018 3708	CARBON	3.3K	JA	1/4W
R1058	401 021 2903	CARBON	5.6K	JA	1/4W
R1059	401 015 2605	CARBON	1.8K	JA	1/4W
R1063	401 016 4707	CARBON	22K	JA	1/4W
R1071	401 017 1705	CARBON	2.7K	JA	1/4W
R1072	401 015 2605	CARBON	1.8K	JA	1/4W
R1104	401 021 1807	CARBON	560	JA	1/4W
R1105	401 012 5609	CARBON	1K	JA	1/4W
R1106	401 012 5609	CARBON	1K	JA	1/4W
R1107	401 016 3700	CARBON	2.2K	JA	1/4W
R1153	401 020 1907	CARBON	4.7K	JA	1/4W
R1154	401 020 1907	CARBON	4.7K	JA	1/4W
R1601	401 021 1807	CARBON	560	JA	1/4W
R1602	401 022 6702	CARBON	75	JA	1/4W
R1603	401 015 0403	CARBON	18	JA	1/4W
R1611	401 012 5609	CARBON	1K	JA	1/4W
R1614	401 012 5609	CARBON	1K	JA	1/4W
R1615	401 022 6702	CARBON	75	JA	1/4W
R1651	401 023 2703	CARBON	8.2K	JA	1/4W
R1652	401 013 6308	CARBON	12K	JA	1/4W
R1653	401 021 0602	CARBON	56	JA	1/4W
R1656	401 012 6903	CARBON	10K	JA	1/4W
R1657	401 021 2903	CARBON	5.6K	JA	1/4W
R1658	401 021 2903	CARBON	5.6K	JA	1/4W
R1659	401 012 6903	CARBON	10K	JA	1/4W
R1671	401 012 4404	CARBON	100	JA	1/4W
R1673	401 012 6903	CARBON	10K	JA	1/4W
R2001	401 012 4404	CARBON	100	JA	1/4W
R2002	401 017 1705	CARBON	2.7K	JA	1/4W
R2003	401 020 7404	CARBON	51	JA	1/4W
R2004	401 019 3905	CARBON	390K	JA	1/4W
R2005	401 021 8905	CARBON	6.2K	JA	1/4W
R2009	401 012 9201	CARBON	1M	JA	1/4W
R2010	401 012 6903	CARBON	10K	JA	1/4W
R2011	401 014 5102	CARBON	15K	JA	1/4W
R2012	401 018 4804	CARBON	33K	JA	1/4W
R2013	401 022 3008	CARBON	6.8K	JA	1/4W
R2014	401 013 5202	CARBON	1.2K	JA	1/4W
R2018	401 016 4707	CARBON	22K	JA	1/4W
R2021	401 017 6106	CARBON	3.3	JA	1/4W
R2022	401 019 9501	CARBON	47	JA	1/4W
R2023	401 014 5102	CARBON	15K	JA	1/4W
R2024	401 019 6104	CARBON	4.7	JA	1/4W
R2091	401 017 1705	CARBON	2.7K	JA	1/4W
R2101	401 019 2908	CARBON	39K	JA	1/4W

LOCATION	PARTS NO.	DESCRIPTION
R2102	401 017 2702	CARBON 27K JA 1/4W
R2103	401 019 2908	CARBON 39K JA 1/4W
R2104	401 016 4707	CARBON 22K JA 1/4W
R2105	401 020 7800	CARBON 510 JA 1/4W
R2106	401 023 1607	CARBON 820 JA 1/4W
R2107	401 021 1807	CARBON 560 JA 1/4W
R2108	401 017 1705	CARBON 2.7K JA 1/4W
R2109	401 017 1705	CARBON 2.7K JA 1/4W
R2110	401 012 5609	CARBON 1K JA 1/4W
R2111	401 022 7105	CARBON 750 JA 1/4W
R3001 ⚠	402 067 7402	FUSIBLE RES 3.3 JA 1/2W
R3002	401 022 7105	CARBON 750 JA 1/4W
R3004	401 014 4006	CARBON 1.5K JA 1/4W
R3008	401 020 1907	CARBON 4.7K JA 1/4W
R3009	401 020 1907	CARBON 4.7K JA 1/4W
R3010	401 020 1907	CARBON 4.7K JA 1/4W
R3011	401 020 2805	CARBON 47K JA 1/4W
R3012	401 020 1907	CARBON 4.7K JA 1/4W
R3013	401 020 1907	CARBON 4.7K JA 1/4W
R3014	401 016 0402	CARBON 200K JA 1/4W
R3015	401 016 0402	CARBON 200K JA 1/4W
R3018	401 012 6903	CARBON 10K JA 1/4W
R3020	401 012 6903	CARBON 10K JA 1/4W
R3022	401 012 8006	CARBON 100K JA 1/4W
R3023	401 012 5609	CARBON 1K JA 1/4W
R3024	401 012 5609	CARBON 1K JA 1/4W
R3025	401 012 5609	CARBON 1K JA 1/4W
R3026	401 012 5609	CARBON 1K JA 1/4W
R3032	401 018 4804	CARBON 33K JA 1/4W
R3034	401 013 6308	CARBON 12K JA 1/4W
R3035	401 012 6903	CARBON 10K JA 1/4W
R3036	401 012 6903	CARBON 10K JA 1/4W
R3045	401 020 1907	CARBON 4.7K JA 1/4W
R3061	401 020 2805	CARBON 47K JA 1/4W
R3062	401 018 4804	CARBON 33K JA 1/4W
R3101	401 012 8006	CARBON 100K JA 1/4W
R3102	401 012 8006	CARBON 100K JA 1/4W
R3103	401 012 8006	CARBON 100K JA 1/4W
R3104	401 012 8006	CARBON 100K JA 1/4W
R3201	401 012 5609	CARBON 1K JA 1/4W
R3202	401 014 4006	CARBON 1.5K JA 1/4W
R3203	401 022 3008	CARBON 6.8K JA 1/4W
R3204	401 016 3700	CARBON 2.2K JA 1/4W
R3205	401 014 4006	CARBON 1.5K JA 1/4W
R3206	401 012 4404	CARBON 100 JA 1/4W
R3207	401 012 6903	CARBON 10K JA 1/4W
R3208	401 016 2505	CARBON 220 JA 1/4W
R3209	401 012 8006	CARBON 100K JA 1/4W
R3210	401 022 3008	CARBON 6.8K JA 1/4W
R3211	401 016 4707	CARBON 22K JA 1/4W
R3212	401 019 7705	CARBON 4.3K JA 1/4W
R3213	401 012 5609	CARBON 1K JA 1/4W
R3501	401 012 8006	CARBON 100K JA 1/4W
R3502	401 012 8006	CARBON 100K JA 1/4W
R3503	401 018 5702	CARBON 330K JA 1/4W
R3504	401 014 6000	CARBON 150K JA 1/4W
R3505	401 014 5102	CARBON 15K JA 1/4W
R3506	401 016 5704	CARBON 220K JA 1/4W
R3507	401 014 6000	CARBON 150K JA 1/4W
R3508	401 017 2702	CARBON 27K JA 1/4W
R3516	401 012 6903	CARBON 10K JA 1/4W
R3517	401 020 2805	CARBON 47K JA 1/4W
R3518	401 020 2805	CARBON 47K JA 1/4W
R3520	401 018 5702	CARBON 330K JA 1/4W
R3521	401 012 6903	CARBON 10K JA 1/4W
R3525	401 012 5609	CARBON 1K JA 1/4W
R3526	401 016 3700	CARBON 2.2K JA 1/4W

LOCATION	PARTS NO.	DESCRIPTION
R3527	401 012 5609	CARBON 1K JA 1/4W
R3528	401 020 7800	CARBON 510 JA 1/4W
R3529	401 020 7800	CARBON 510 JA 1/4W
R3537	401 023 2703	CARBON 8.2K JA 1/4W
R3546	401 020 1907	CARBON 4.7K JA 1/4W
R3547	401 014 5102	CARBON 15K JA 1/4W
R3549	401 012 6903	CARBON 10K JA 1/4W
R3550	401 023 2703	CARBON 8.2K JA 1/4W
R3556	401 012 6903	CARBON 10K JA 1/4W
R3557	401 018 5702	CARBON 330K JA 1/4W
R3558	401 020 0702	CARBON 470 JA 1/4W
R3560	401 012 5609	CARBON 1K JA 1/4W
R5001 ⚠	402 064 1502	CARBON 2.7M KA 1/2W
R5003	401 069 4402	OXIDE-MT 68K JA 2W
R5005	401 090 0404	CARBON 680K JA 1/2W
R5006	401 090 0404	CARBON 680K JA 1/2W
R5009	401 012 3308	CARBON 10 JA 1/4W
R5010	401 057 5107	OXIDE-MT 0.47 JA 1W
R5105	401 107 5200	MT-FILM 560 FD 1/4W
R5106	401 107 5309	MT-FILM 620 FD 1/4W
R5107	401 019 7200	CARBON 430 JA 1/4W
R5108	401 012 5609	CARBON 1K JA 1/4W
R5109	401 021 8905	CARBON 6.2K JA 1/4W
R5110	401 016 3700	CARBON 2.2K JA 1/4W
R5111	401 012 5609	CARBON 1K JA 1/4W
R5112	401 013 6308	CARBON 12K JA 1/4W
R5113	401 016 7401	CARBON 240 JA 1/4W
R5114	401 016 7401	CARBON 240 JA 1/4W
R5115	401 106 9704	MT-FILM 82 FD 1/4W
R5117	401 016 7401	CARBON 240 JA 1/4W
R5118	401 016 7401	CARBON 240 JA 1/4W
R5120 ⚠	402 068 0808	FUSIBLE RES 3.9 JA 1/4W
R6001	401 018 2701	CARBON 330 JA 1/4W
R6002	401 019 0904	CARBON 390 JA 1/4W
R6003	401 012 9201	CARBON 1M JA 1/4W
R6004	401 019 3905	CARBON 390K JA 1/4W
R6005	401 020 3802	CARBON 470K JA 1/4W
R6006	401 019 3905	CARBON 390K JA 1/4W
R6007	401 017 3709	CARBON 270K JA 1/4W
R6008	401 012 5609	CARBON 1K JA 1/4W
R6010	401 012 8006	CARBON 100K JA 1/4W
R6011	401 012 8006	CARBON 100K JA 1/4W
R6014	401 015 9406	CARBON 2K JA 1/4W
R6611	401 013 9408	CARBON 1.3K JA 1/4W
R6612	401 015 2605	CARBON 1.8K JA 1/4W
R6613	401 021 1807	CARBON 560 JA 1/4W
R6621	401 021 2903	CARBON 5.6K JA 1/4W
R6622	401 012 5609	CARBON 1K JA 1/4W
R6623	401 023 1607	CARBON 820 JA 1/4W
R6624	401 015 2605	CARBON 1.8K JA 1/4W
R6901	401 012 5609	CARBON 1K JA 1/4W
R6902	401 018 2701	CARBON 330 JA 1/4W
R6903	401 021 8103	CARBON 620 JA 1/4W
R6904	401 012 6903	CARBON 10K JA 1/4W
R6905	401 018 5702	CARBON 330K JA 1/4W
R6906	401 012 6903	CARBON 10K JA 1/4W
R6907	401 018 3708	CARBON 3.3K JA 1/4W
R6908	401 023 0600	CARBON 82 JA 1/4W
R6909	401 012 5609	CARBON 1K JA 1/4W
R6910	401 020 7800	CARBON 510 JA 1/4W
R6911	401 021 2903	CARBON 5.6K JA 1/4W
R6912	401 019 1802	CARBON 3.9K JA 1/4W
R6921	401 019 1802	CARBON 3.9K JA 1/4W
R6923	401 012 6903	CARBON 10K JA 1/4W
R6924	401 012 6903	CARBON 10K JA 1/4W
R6925	401 015 3701	CARBON 18K JA 1/4W
R6926	401 014 5102	CARBON 15K JA 1/4W

LOCATION	PARTS NO.	DESCRIPTION
R6927	401 013 6308	CARBON 12K JA 1/4W
R6928	401 012 4404	CARBON 100 JA 1/4W
R6929	401 018 4804	CARBON 33K JA 1/4W
(SWITCHES)		
S3101	645 000 3363	SWITCH,PUSH
OR	613 139 4308	SW,PUSH
S3102	645 000 3363	SWITCH,PUSH
OR	613 139 4308	SW,PUSH
S3103	645 000 3363	SWITCH,PUSH
OR	613 139 4308	SW,PUSH
S3104	645 000 3363	SWITCH,PUSH
OR	613 139 4308	SW,PUSH
S3105	645 000 3363	SWITCH,PUSH
OR	613 139 4308	SW,PUSH
S3106	645 000 3363	SWITCH,PUSH
OR	613 139 4308	SW,PUSH
S3107	645 000 3363	SWITCH,PUSH
OR	613 139 4308	SW,PUSH
S3108	645 000 3363	SWITCH,PUSH
OR	613 139 4308	SW,PUSH
S3117	645 000 3363	SWITCH,PUSH
OR	613 139 4308	SW,PUSH
S3118	645 000 3363	SWITCH,PUSH
OR	613 139 4308	SW,PUSH
(FUSE)		
F5001 ⚠	423 022 6506	FUSE 250V 2.5A
(PROTECTOR)		
PR511 ⚠	613 138 8871	CIRCUIT PROTECTOR
(CONNECTORS)		
CN161	613 111 5712	SOCKET,21P
OR	645 002 4528	SOCKET,RGB 21P
CN501 ⚠	645 000 5411	SOCKET,INLET AC
(MISCELLANEOUS)		
	613 053 8055	FIXER
	613 136 4554	HOLDER,FUSE,F5001

****

COMPL PWB,VP-1

COMPL.NO 613 146 4988

LOCATION	PARTS NO.	DESCRIPTION
(SEMICONDUCTORS)		
Q1801	405 015 9701	TR 2SC2814-F4
OR	405 015 9909	TR 2SC2814-F5
OR	405 035 6100	TR 2SC2413K-Q
Q1851	405 015 9701	TR 2SC2814-F4
OR	405 015 9909	TR 2SC2814-F5
OR	405 035 6100	TR 2SC2413K-Q
Q1852	405 015 9701	TR 2SC2814-F4
OR	405 015 9909	TR 2SC2814-F5
OR	405 035 6100	TR 2SC2413K-Q
(INTEGRATED CIRCUIT)		
IC181	409 302 2802	IC LA7377A
(VARIABLE RESISTORS)		
VR182	613 117 1718	VR,SEMI 2.2KB
OR	613 002 0369	SEMI VR 2.2KB
(INDUCTORS)		
L1801	613 014 0968	COIL,INDUCTOR 82UHK
OR	613 014 4485	HF CHOKE 82UHK
L1802	613 014 0951	COIL,INDUCTOR 68UHK
L1802	613 014 4478	HF CHOKE 68UHK
L1851	613 014 0821	COIL,INDUCTOR 5.6UHK
OR	613 014 4348	HF CHOKE 5.6UHK
L1852	613 014 0944	COIL,INDUCTOR 56UHK
OR	613 014 4461	HF CHOKE 56UHK
L1853	613 014 0876	COIL,INDUCTOR 15UHK
OR	613 014 4393	HF CHOKE 15UHK
L1854	613 014 0876	COIL,INDUCTOR 15UHK
OR	613 014 4393	HF CHOKE 15UHK
(CAPACITORS)		
C1801	403 154 3307	OS-SOLID 4.7U M 10V
C1804	403 069 5601	CERAMIC 0.01U K 50V
C1805	403 193 8509	ELECT 0.33U M 50V
C1807	403 026 7600	CERAMIC 470P J 50V
C1808	403 034 6800	CERAMIC 91P J 50V
C1809	403 069 5601	CERAMIC 0.01U K 50V
C1810	403 069 5601	CERAMIC 0.01U K 50V
C1811	403 069 5601	CERAMIC 0.01U K 50V
C1812	403 069 5601	CERAMIC 0.01U K 50V
C1813	403 073 1200	CERAMIC 0.033U K 50V
C1814	403 073 1200	CERAMIC 0.033U K 50V
C1851	403 069 5601	CERAMIC 0.01U K 50V
C1852	403 022 8304	CERAMIC 33P J 50V
C1853	403 022 8304	CERAMIC 33P J 50V
C1854	403 026 2902	CERAMIC 47P J 50V
C1855	403 028 4201	CERAMIC 56P J 50V
C1861	403 069 5601	CERAMIC 0.01U K 50V
C1862	403 163 7907	ELECT 47U M 6.3V
(RESISTORS)		
R1801	401 038 7700	MT-GLAZE 5.6K JA 1/10W
R1803	401 037 5608	MT-GLAZE 10K JA 1/10W
R1805	401 037 7909	MT-GLAZE 1.5K JA 1/10W
R1807	401 037 5400	MT-GLAZE 1K JA 1/10W
R1808	401 037 9200	MT-GLAZE 1.8K JA 1/10W
R1810	401 037 5400	MT-GLAZE 1K JA 1/10W
R1811	401 038 5904	MT-GLAZE 4.3K JA 1/10W
R1813	401 037 5400	MT-GLAZE 1K JA 1/10W
R1814	401 038 0800	MT-GLAZE 22K JA 1/10W
R1815	401 038 7700	MT-GLAZE 5.6K JA 1/10W
R1816	401 037 6704	MT-GLAZE 1.2K JA 1/10W
R1851	401 037 5400	MT-GLAZE 1K JA 1/10W
R1852	401 038 0701	MT-GLAZE 2.2K JA 1/10W
R1853	401 038 0701	MT-GLAZE 2.2K JA 1/10W
R1854	401 038 5003	MT-GLAZE 390 JA 1/10W
R1855	401 038 5003	MT-GLAZE 390 JA 1/10W
R1856	401 039 0304	MT-GLAZE 820 JA 1/10W
R1857	401 039 0304	MT-GLAZE 820 JA 1/10W
R1858	401 039 0304	MT-GLAZE 820 JA 1/10W
R1859	401 038 7601	MT-GLAZE 560 JA 1/10W
R1860	401 038 2002	MT-GLAZE 270 JA 1/10W
(JUMPERS)		
J1863	401 037 5004	MT-GLAZE 0.000 ZA 1/10W
J1886	401 037 5004	MT-GLAZE 0.000 ZA 1/10W

****

COMPL PWB,TM-1

COMPL.NO 613 144 4461

(REMOTE RECEIVERS)		
RR711	613 129 0938	IR RECEIVER PACK UNIT
OR	613 134 9087	IR RECEIVER PACK UNIT
(DISPLAYS)		
A7101	613 140 4007	FLUORESCENT TUBE
OR	613 140 4014	FLUORESCENT TUBE

(MISCELLANEOUS)

LOCATION	PARTS NO.	DESCRIPTION
	613 139 2267	HOLDER FL

****

COMPL PCB,TM-8

COMPL.NO 613 134 4730

(INTEGRATED CIRCUIT)

LOCATION	PARTS NO.	DESCRIPTION
IC781	409 148 5104	IC SDA5642

(CAPACITORS)

LOCATION	PARTS NO.	DESCRIPTION
C7802	403 013 3103	CERAMIC 150P J 50V
C7803	403 256 4608	MT-COMPO 0.33U J 50V
C7804	403 057 2407	POLYESTER 0.1U J 50V

(RESISTORS)

LOCATION	PARTS NO.	DESCRIPTION
R7805	401 038 0701	MT-GLAZE 2.2K JA 1/10W
R7806	401 037 5806	MT-GLAZE 1M JA 1/10W
R7807	401 039 0601	MT-GLAZE 820K JA 1/10W
R7808	401 037 5707	MT-GLAZE 100K JA 1/10W
R7809	401 037 5608	MT-GLAZE 10K JA 1/10W
R7810	401 037 7008	MT-GLAZE 1.2M JA 1/10W
R7811	401 037 5202	MT-GLAZE 100 JA 1/10W
R7812	401 038 7700	MT-GLAZE 5.6K JA 1/10W

****

COMPL PCB,MC-1

COMPL.NO 613 120 9060

(DIODES)

LOCATION	PARTS NO.	DESCRIPTION
D8001	407 094 1300	PHOTO COUPLE SPI-315-04-C
OR	407 043 0101	PHOTO DIODE ON2170-R

(RESISTORS)

LOCATION	PARTS NO.	DESCRIPTION
R8001	401 026 0607	CARBON 270 JA 1/6W
OR	401 017 0708	CARBON 270 JA 1/4W
R8002	401 024 6700	CARBON 100 JA 1/6W
OR	401 012 4404	CARBON 100 JA 1/4W

(SWITCH)

LOCATION	PARTS NO.	DESCRIPTION
S8001	613 022 4545	SPECIAL SWITCH

****

FLEXIBLE FLAT CABLE

LOCATION	PARTS NO.	DESCRIPTION
	613 144 4577	FLEXIBLE FLAT CABLES CN303-CN811
	613 145 8475	FLEXIBLE FLAT CABLES CN101-CN181

VHR-330G

BLOCK DIAGRAMS,CIRCUIT DIAGRAMS & PRINTED WIRING BOARDS

TABLE OF CONTENTS

Page

1. OVERALL WIRING, MECHANISM CONNECTION, & BLOCK DIAGRAMS

OVERALL WIRING 1
MECHANISM CONNECTION 3
VIDEO CIRCUIT 4
SYSTEM CONTROL & SERVO CIRCUIT 7
AUDIO CIRCUIT 10

2. CIRCUIT DIAGRAMS & PRINTED WIRING BOARDS (P.W.B.)

CP-1 P.W.B. 11
CP-1 BOARD (PW-A) POWER SUPPLY 13
CP-1 BOARD (AD-A) AUDIO 14
CP-1 BOARD (VD-A) VIDEO 16
VIDEO CIRCUIT WAVEFORMS 18
VP-1 BOARD VIDEO PRE-AMP 19
CP-1 BOARD (CV-A) RF CONVERTER CONNECTION 19
VP-1 P.W.B. 20
CP-1 BOARD (TN-A) TUNER IF CONNECTION 20
IC301 SYSTEM CONTROL,TIMER, & TUNING CONTROL MPU PIN FUNCTIONS TABLE 22
CP-1 BOARD (SY-A) SYSTEM CONTROL 23
CP-1 BOARD (SV-A) SERVO 25
SERVO CIRCUIT WAVEFORMS 27
ON SCREEN (IC321) WAVEFORMS 27
TM-1 BOARD DISPLAY (FLD) 28
TM-1 P.W.B. 28
A7101 DISPLAY (FLD) GRID/ANODE ASSIGNMENT DRAWING & TABLE 29
TM-8 BOARD VPS 30
TM-8 P.W.B. 30

TP1/G 41N

REFERENCE NO.SM531333

NOTES:

1. All resistance values in "OHMS" unless otherwise noted. (K=1,000 M=1,000,000)
2. All capacitance values in "μfd" unless otherwise noted. p=pico farad
3. All inductance values in "mH" unless otherwise noted. μ=micro henry

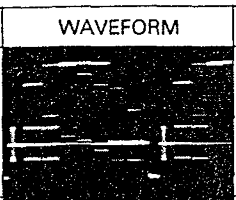
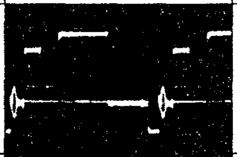
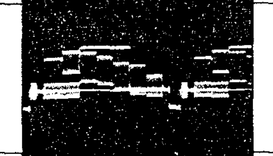
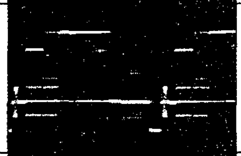
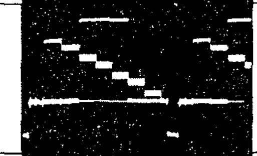
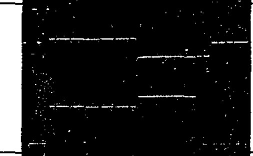
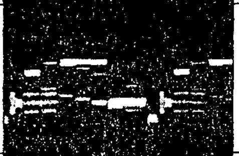
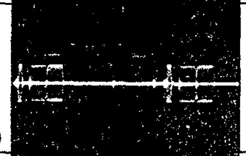
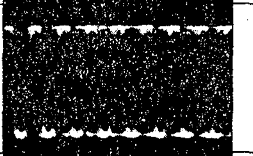
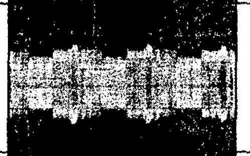
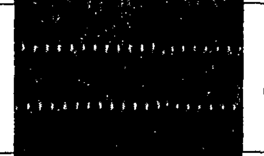
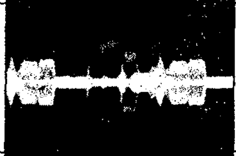
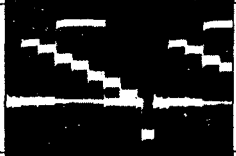
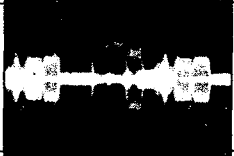
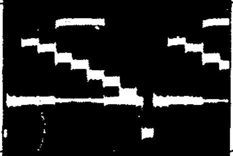
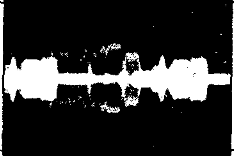
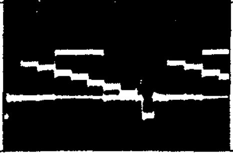
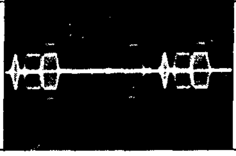
PRODUCT SAFETY NOTICE

THE COMPONENTS DESIGNATED BY A SYMBOL (⚠) IN THIS SCHEMATIC DIAGRAM DESIGNATES COMPONENTS WHOSE VALUE ARE OF SPECIAL SIGNIFICANCE TO PRODUCT SAFETY. SHOULD ANY COMPONENT DESIGNATED BY A SYMBOL NEED TO BE REPLACED, USE ONLY THE PART DESIGNATED IN THE PARTS LIST. DO NOT DEVIATE FROM THE RESISTANCE, WATTAGE AND VOLTAGE RATINGS SHOWN.

PAL-A

VIDEO CIRCUIT WAVEFORMS

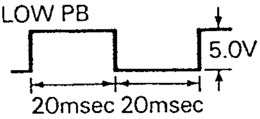
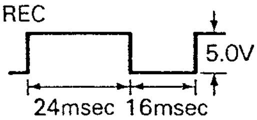
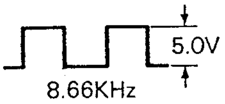
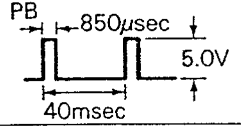
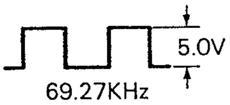
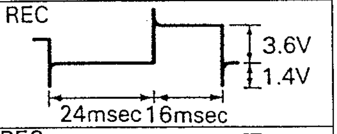
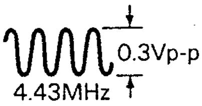
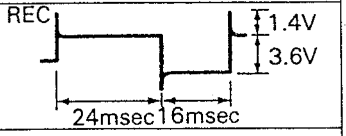
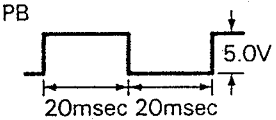
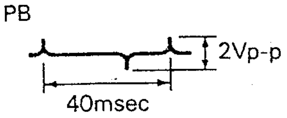
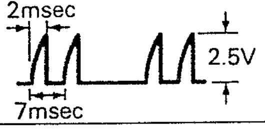
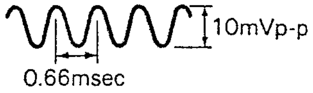
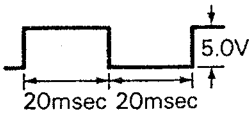
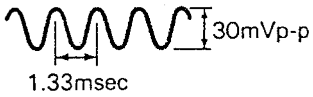
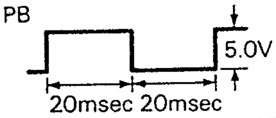
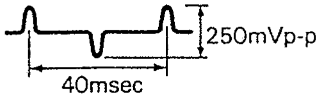
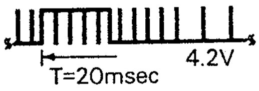
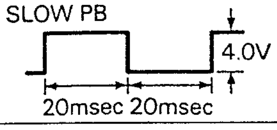
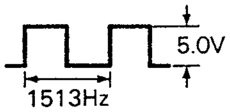
WF-V-TP

TEST LOCATION	WAVEFORM	MODE/LEVEL	TEST LOCATION	WAVEFORM	MODE/LEVEL
IC101 Pin 33 (VIDEO IN)		REC, EE 1 Vp-p	IC101 Pin 30 (VIDEO OUT)		PB 2.5 Vp-p
IC101 Pin 41		REC, EE 0.6 Vp-p	IC101 Pin 30 (VIDEO OUT)		REC, EE 2 Vp-p
IC101 Pin 42		REC, EE 0.5 Vp-p	IC101 (UPPER) Pin 30 (LOWER) Pin 28		STILL (UPPER) 2 Vp-p (LOWER) 5 Vp-p
IC101 Pin 43		REC, EE 1.2 Vp-p	IC101 Pin 10 (REC CHROMA OUT)		REC, EE 0.4 Vp-p
IC101 Pin 36 (REC FM OUT)		REC, EE 1.0 Vp-p	Q1006 Base (PB CHROMA)		PB 0.3 Vp-p
IC101 Pin 35 (PB FM IN)		PB 0.3 Vp-p	Q1007 Emitter (PB CHROMA)		PB 0.2 Vp-p
IC101 Pin 41		PB 0.5 Vp-p	IC101 Pin 10 (PB CHROMA IN)		PB 0.2 Vp-p
IC101 Pin 42		PB 0.5 Vp-p	IC101 Pin 20		PB 1.0 Vp-p
IC101 Pin 7/4		PB 0.3 Vp-p	IC101 Pin 26		PB 0.6 Vp-p

IC301 SYSTEM CONTROL,TIMER, & TUNING CONTROL MPU PIN FUNCTIONS TABLE

No.	Name	I/O	I/O Signal Function
1	S - PLAY	O	Signal for indicating CUE , REV , STILL and SLOW modes.
2	CAP P.	O	Gain down control for Head Motor Amplifier at SLOW mode.
3	DRUM UP	O	Head drum motor rotation speed up signal.
4	SS + DRUM SHIFT	O	Signal for indicating SLOW/STILL modes and alternation of drum motor control data. (3 value voltage)
5	MC - BR	O	Brake signal for capstan motor.
6	C - Vs CUT	O	Cut off for capstan motor control voltage in SLOW / STILL modes.
7	0 / 1 DATA	I	CTL pulse duty detection signal input. Used for VISS detection.
8	-	-	-
9	PAL- L(MESECAM H)	I	PAL mode indication signal input.
10	FL- START SW	I	Switch input indicating start of cassette loading or discharge by cassette mechanism.
11	-	-	-
12	RESET	I	Initial reset terminal for this IC.
13	XT1	-	Clock OSC during power failures. Frequency is 32.672kHz.
14	XT2	-	
15	VSS	-	Ground terminal
16	CF1	-	IC clock OSC terminal. Frequency is 13.92MHz.
17	CF2	-	
18	VDD	-	IC power supply terminal.(5Vdc)
19	T. END S.	I	Sensor signal input for tape end detection.
20	T. TOP S.	I	Sensor signal input for tape beginning detection.
21	POWER DOWN	I	Power failure detection terminal.
22	T. REEL P.	I	Pulse input for detection of take-up reel table rotation.
23	TAPE SPEED	I	Input of result of tape speed discrimination by digital servo IC.
24	AFT- C	I	Tuner AFT S-curve signal input for tuner AFT control.
25	ENV.	I	Video head envelope detection signal input for ATR function.
26	-	-	-
27	SHORT TEST	I	REC mode indication signal input (REC 12V).
28	W. ASP/ AV CTL IN	I	AV source selection signal input from AV terminal.
29	-	-	-
30	STILL + SLOW	O	STILL or SLOW modes indication signal output.
31	C - FG P.	I	FG signal input of capstan motor.
32	-	-	-
33	CTL P.	I	CTL head recording / playback pulse signal input.
34	H SYNC	I	Sync. signal input for existing channel discrimination and TV system discrimination.
35	RF SW P.	I	Input of RF switching pulse created by head drum PG.
36	REMOCON	I	Remote control signal input.
37	AFT MUTE	O	"H" output during TU AFT mute. (V-syn model only)
38	-	-	-
39	G8	O	Display grid outputs (FLD).
40	G7	O	
41	G6	O	
42	G5	O	
43	G4	O	
44	G3	O	
45	G2	O	
46	G1	O	
47	VDD	-	IC power supply input.(5Vdc)
48	V LOAD	O	-30V input for FLD drive.
49	NAP LED	O	Signal for NAP indicator LED drive.
50	NTSC 4.43 LED	O	Signal for NTSC4.43 indicator LED drive.
51	-	-	-
52	-	-	-
53	SEG l	O	Display segment outputs (FLD). (Includes key-scan output)
54	SEG k	O	
55	SEG j	O	Display segment outputs (FLD). (Includes key-scan output)
56	SEG i	O	
57	SEG h	O	
58	SEG g	O	
59	SEG f	O	
60	SEG e	O	
61	SEG d	O	
62	SEG c	O	
63	SEG b	O	
64	SEG a	O	
65	KEY IN 0	I	Operation key data inputs.
66	KEY IN 1	I	
67	KEY IN 2	I	
68	KEY IN 3	I	
69	SW DATA 0	I	3-bit data indicating operation position of mechanism.
70	SW DATA 1	I	
71	SW DATA 2	I	
72	SAFETY SW	I	Terminal for accidental erasure prevention switch. No operation to record mode while "HIGH" is input.
73	SV S. DATA	O	Output 8-bit X 4 serial data giving operation mode and tracking data,etc., to digital servo IC.
74	OSD CS	O	Chip enable (access) signal output to OSD IC.
75	SV S. CLK	O	The clock pulse for digital servo IC.
76	S. DATA (OSD/CH+)	I/O	Terminal for communication of respective data with OSD IC and CH+ control IC.
77	I2C SDA	I/O	Data exchange with tuning memory IC and VPS IC.
78	S. CLK (OSD/I2C)	O	The clock pulse for OSD IC and tuning memory IC.
79	INPUT SEL A	O	Signal for selecting audio input source.
80	PLL CS	O	Chip enable signal output to tuner PLL tuning system IC. (F-syn model)
	PWM	O	Tuning voltage output (PWM signal). (V-syn model)
81	50 / 60	O	" LOW " output during NAP or NTSC4.43 modes. (60 field mode)
82	TUNER SOUND	O	TV system indication signal output (PAL I or DK).
83	BAND 1	O	Tuning band data(BAND 1 and 2 ; for V-syn model).
	PLL DATA	O	Data exchange with tuner PLL IC (for F-syn model).
84	BAND 2	O	BAND 1 and 2 ; (L,L)=VHF-LOW (L,H)=VHF-HIGH (H,L)=UHF (H,H)=SKIP. (for V-syn model)
	PLL CLK	O	The clock for PLL IC of tuner unit (for F-syn model).
85	CH+ CLK	O	The clock for CH+ input/output source selection IC.
	AV1 / AV2	O	Signal for selecting AV-input (video/audio) source.
86	INPUT SEL V	O	Signal for selecting video input source.
	FSS IN	I	CH+ mode control signal input (CH+ model).
87	NTSC 4.43	O	" H " output during NTSC 4.43 playback mode.
88	-	-	-
89	VSS	-	IC ground terminal.
90	VDD	-	IC power supply input.(5Vdc)
91	ML- F	O	Loading motor rotation direction (FWD) indication signal.
92	ML- R	O	Loading motor rotation direction (REV) indication signal.
93	ML- L	O	Loading motor rotation speed (low speed) indication signal.
94	ML- M	O	Loading motor rotation speed (medium speed) indication signal.
95	REC H	O	Signal for indicating recording mode.
96	PB H	O	Signal for indicating playback mode.
97	A MUTE	O	"H" output for disable audio output signal.
98	-	-	-
99	AV CTL	O	AV terminal (pin8 of 21pins AV socket) control signal output.
	ANT / VTR	O	Selection the RF source of ANTENNA or VTR.
100	POWER UP	O	"HIGH" output except when power is off. Indicating that power is ON.

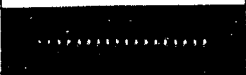
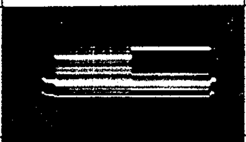
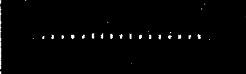
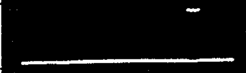
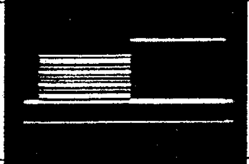
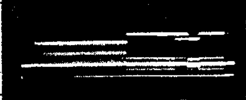
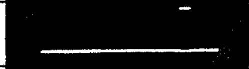
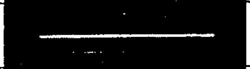
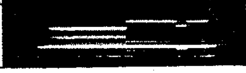
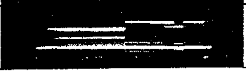
SERVO CIRCUIT WAVEFORMS (IC351:XRU2890 Series)

TEST LOCATION	WAVEFORM & MODE/LEVEL	TEST LOCATION	WAVEFORM & MODE/LEVEL
Pin 40 (H.A.SWITCHING)	 SLOW PB 5.0V 20msec 20msec	Pin 15 (CTL PULSE)	 REC 5.0V 24msec 16msec
Pin 42 (PWM)		Pin 15 (CTL PULSE)	 PB 850μsec 5.0V 40msec
Pin 41, 44, 1 (PWM)	 5.0V 69.27KHz	Pin 21 (CTL HEAD–)	 REC 3.6V 1.4V 24msec 16msec
Pin 3 (FSC INPUT)	 0.3Vp-p 4.43MHz	Pin 22 (CTL HEAD+)	 REC 1.4V 3.6V 24msec 16msec
Pin 5 (ROTARY)	 PB 5.0V 20msec 20msec	Pin 26 (CTL AMP OUT)	 PB 2Vp-p 40msec
Pin 8 (D-PG MM)	 2msec 2.5V 7msec	Pin 28 (C-FG INPUT)	 10mVp-p 0.66msec
Pin 9 (RF SW PULSE)	 5.0V 20msec 20msec	Pin 29 (D-FG INPUT)	 30mVp-p 1.33msec
Pin 10 (AF SW PULSE)	 PB 5.0V 20msec 20msec	Pin 30 (D-PG INPUT)	 250mVp-p 40msec
Pin 11 (COMPOSITE SYNC INPUT)	 4.2V T=20msec	Pin 38 (ENV.SW INPUT)	 SLOW PB 4.0V 20msec 20msec
Pin 14 (C-FG PULSE)			

WF-S-TP4

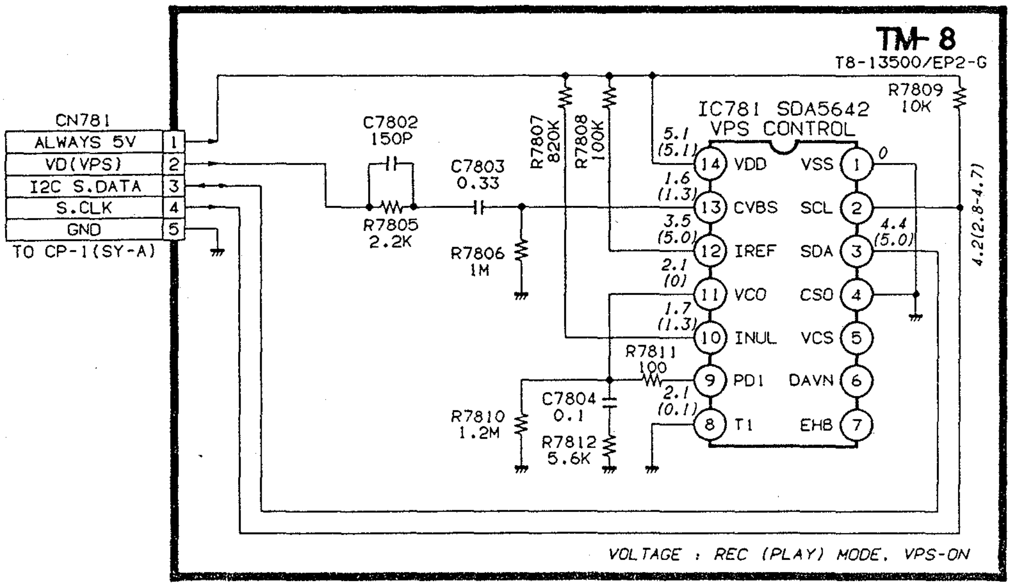
ON SCREEN (IC321) WAVEFORMS

(MODE: REC EE/ON SCREEN)

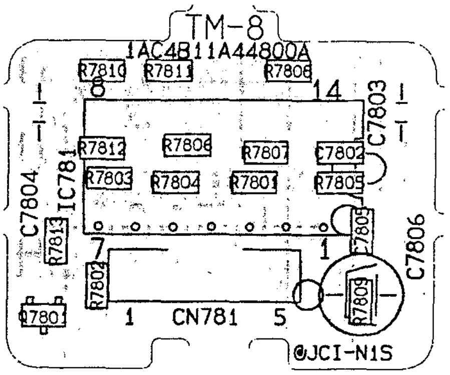
TEST LOCATION	WAVEFORM	LEVEL	TEST LOCATION	WAVEFORM	LEVEL
Pin 5 (17.7MHz X-TAL)		2Vp-p	Pin 19 (CV cr)		2Vp-p
Pin 6 (17.7MHz X-TAL)		3Vp-p			
Pin 14 (HALF TONE)		5Vp-p	Pin 20 (SYNC IN)		2Vp-p
Pin 16 (VIDEO OUT: WITH ON SCREEN)		2Vp-p			
Pin 14 (HALF TONE)		5Vp-p	Pin 23 (PD OUT)		4.5Vp-p
Pin 18 (VIDEO IN)		2Vp-p	Pin 16 (VIDEO OUT)		2Vp-p

WF-UFO-TP4

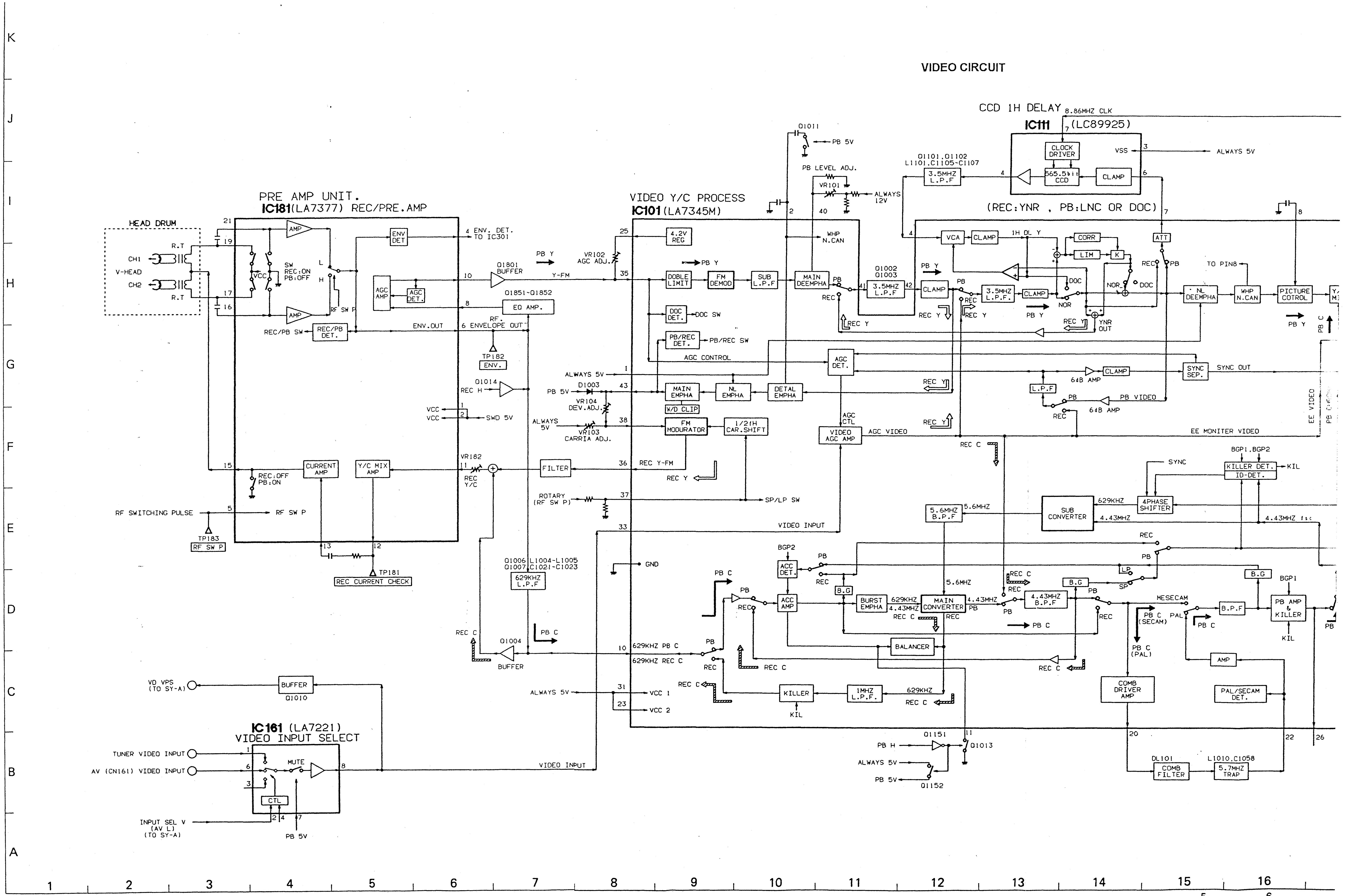
TM-8 BOARD VPS


TM-8
T8-13500/EP2-G
CN781
ALWAYS 5V 1
VD(VPS) 2
I2C S.DATA 3
S.CLK 4
GND 5
TO CP-1(SY-A)
C7802
150P
R7805
2.2K
C7803
0.33
R7806
1M
R7807
820K
R7808
100K
R7809
10K
IC781 SDA5642
VPS CONTROL
5.1
(5.1)
14 VDD
1.6
(1.3)
13 CVBS
3.5
(5.0)
12 IREF
2.1
(0)
11 VCO
1.7
(1.3)
10 INUL
R7811
100
9 PD1
2.1
(0.1)
8 T1
VSS 1
0
SCL 2
4.4
(5.0)
SDA 3
CSO 4
VCS 5
DAVN 6
EHB 7
4.2(2.8-4.7)
C7804
0.1
R7810
1.2M
R7812
5.6K
VOLTAGE : REC (PLAY) MODE. VPS-ON

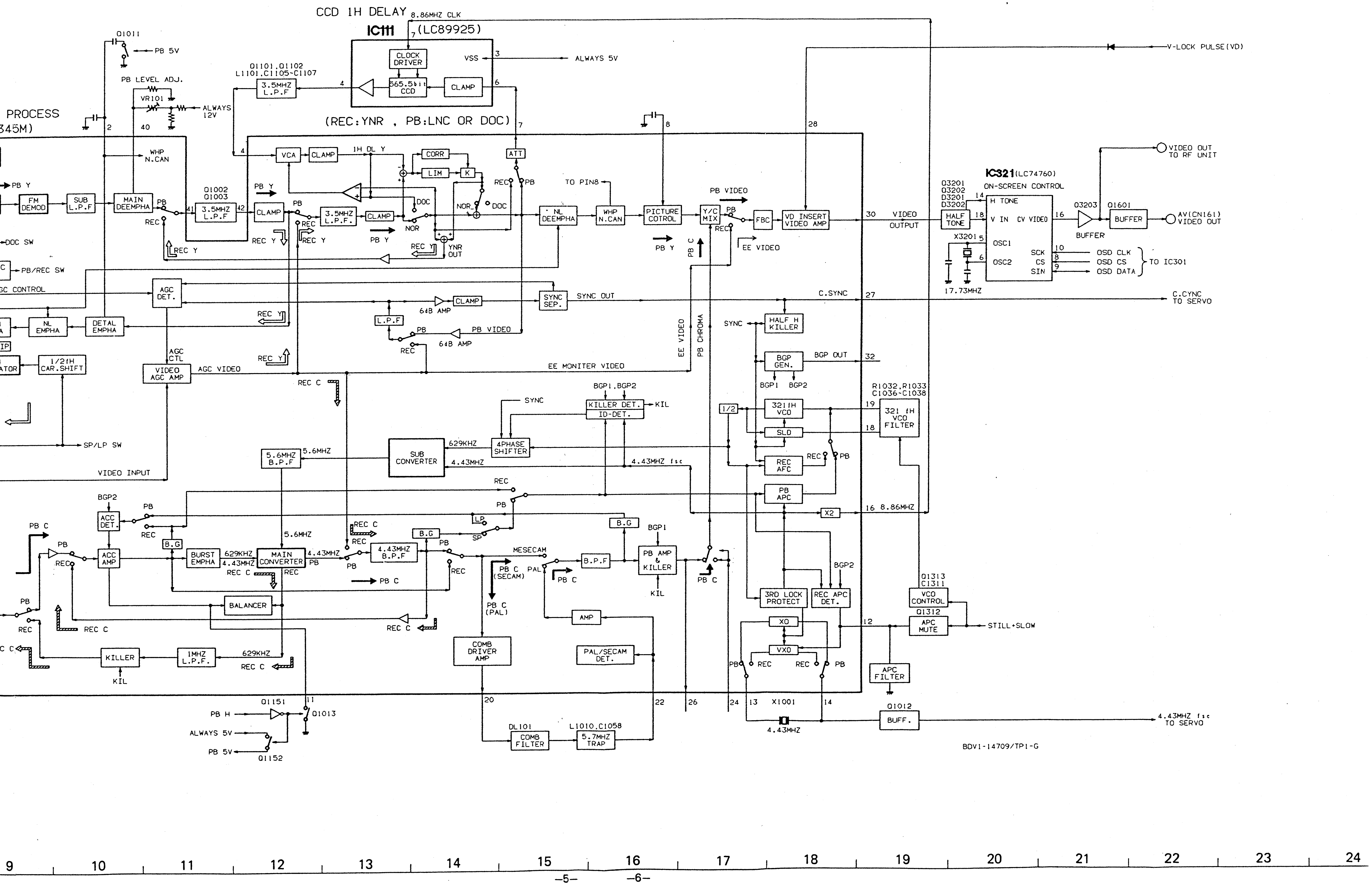
TM-8 P.W.B.


TM-8
1AC4B11A44800A
R7810
R7811
R7806
8
14
C7803
R7812
R7808
R7807
C7802
R7803
R7804
R7801
R7805
IC781
C7804
R7813
C7805
7
1
C7806
R7802
R7809
780
1
CN781
5
©JCI-N1S

VIDEO CIRCUIT

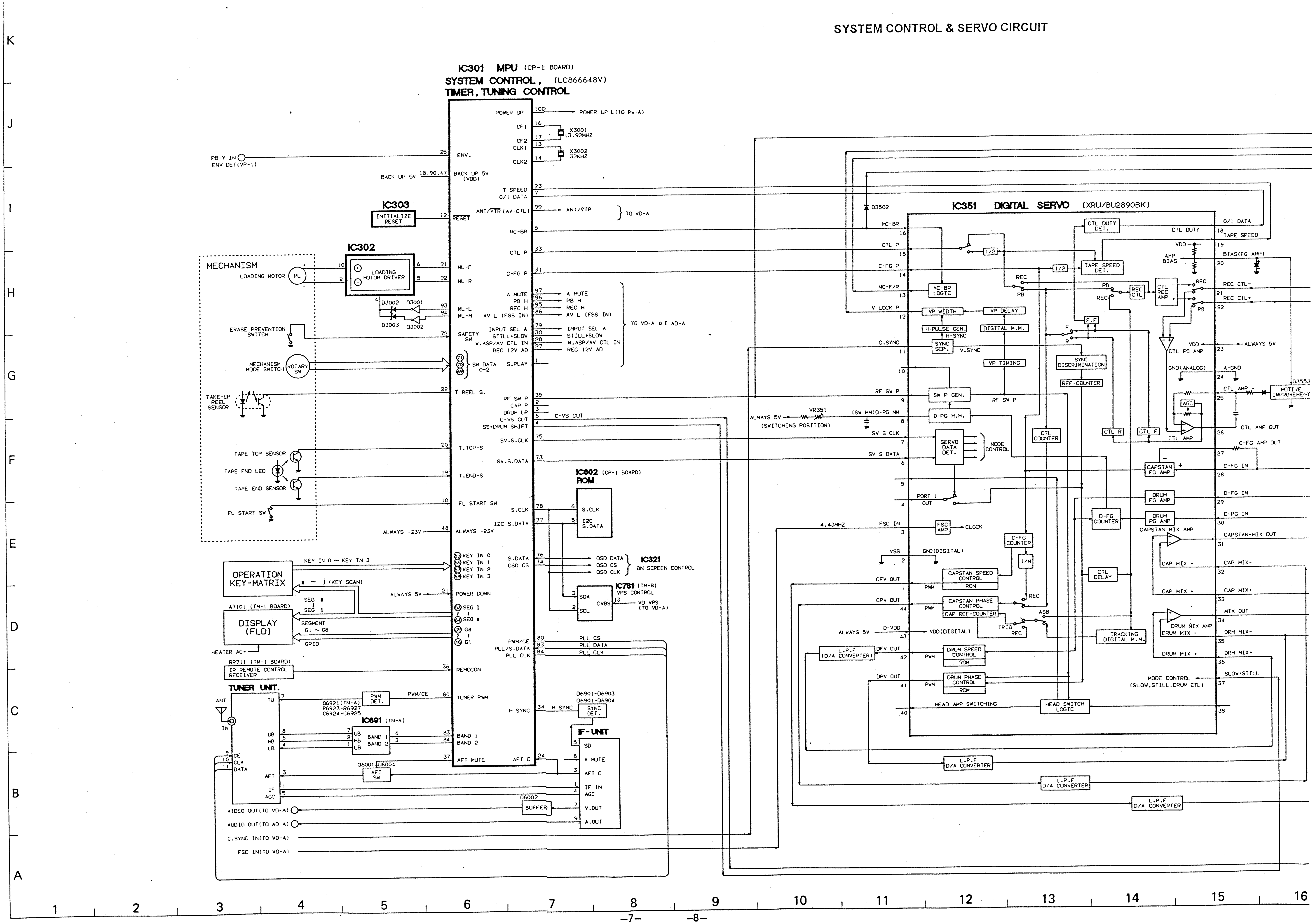

K
J
I
H
G
F
E
D
C
B
A
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
HEAD DRUM
CH1
V-HEAD
CH2
R.T
R.T
PRE AMP UNIT.
IC181(LA7377) REC/PRE.AMP
AMP
AMP
SW
REC:ON
PB:OFF
VCC
ENV
DET
AGC
AMP
AGC
DET.
RF SW P
REC/PB SW
REC/PB
DET.
ENV.OUT
4 ENV. DET.
TO IC301
Q1801
BUFFER
Y-FM
PB Y
Q1851-Q1852
EQ AMP.
RF.
6 ENVELOPE OUT
TP182
ENV.
Q1014
REC H
VCC
VCC
SWD 5V
CURRENT
AMP
Y/C MIX
AMP
REC:OFF
PB:ON
VR182
REC
Y/C
FILTER
RF SWITCHING PULSE
RF SW P
TP183
RF SW P
TP181
REC CURRENT CHECK
Q1006 L1004-L1005
Q1007 C1021-C1023
629KHZ
L.P.F
REC C
Q1004
BUFFER
PB C
VD VPS
(TO SY-A)
BUFFER
Q1010
IC161 (LA7221)
VIDEO INPUT SELECT
TUNER VIDEO INPUT
AV (CN161) VIDEO INPUT
MUTE
CTL
INPUT SEL V
(AV L)
(TO SY-A)
PB 5V
VIDEO INPUT
VIDEO Y/C PROCESS
IC101(LA7345M)
VR102
AGC ADJ.
4.2V
REG
PB Y
DOBLE
LIMIT
FM
DEMOD
SUB
L.P.F
MAIN
DEEMPHA
DOC
DET.
DOC SW
PB/REC
DET.
PB/REC SW
AGC CONTROL
ALWAYS 5V
Q1003
PB 5V
VR104
DEV.ADJ.
ALWAYS
5V
VR103
CARRIA ADJ.
MAIN
EMPHA
W/D CLIP
NL
EMPHA
DETAL
EMPHA
FM
MODURATOR
1/2H
CAR.SHIFT
REC Y-FM
REC Y
ROTARY
(RF SW P)
SP/LP SW
VIDEO INPUT
GND
ALWAYS 5V
VCC 1
VCC 2
629KHZ PB C
629KHZ REC C
Q1011
PB 5V
PB LEVEL ADJ.
VR101
ALWAYS
12V
WHP
N.CAN
Q1002
Q1003
3.5MHZ
L.P.F
REC Y
AGC
DET.
AGC
CTL
VIDEO
AGC AMP
AGC VIDEO
Q1101,Q1102
L1101,C1105-C1107
3.5MHZ
L.P.F
CCD 1H DELAY
8.86MHZ CLK
IC111 (LC89925)
CLOCK
DRIVER
565.5bit
CCD
CLAMP
VSS
ALWAYS 5V
(REC:YNR , PB:LNC OR DOC)
VCA
CLAMP
1H DL Y
CORR
LIM
K
ATT
CLAMP
3.5MHZ
L.P.F.
CLAMP
DOC
NOR
NOR
DOC
YNR
OUT
TO PIN8
NL
DEEMPHA
WHP
N.CAN
PICTURE
COTROL
PB Y
PB C
SYNC
SEP.
SYNC OUT
CLAMP
64B AMP
L.P.F
PB VIDEO
64B AMP
EE MONITER VIDEO
EE VIDEO
REC C
BGP1,BGP2
SYNC
KILLER DET.
ID-DET.
KIL
5.6MHZ
B.P.F
5.6MHZ
SUB
CONVERTER
629KHZ
4.43MHZ
4PHASE
SHIFTER
4.43MHZ fsc
BGP2
ACC
DET.
B.G
ACC
AMP
BURST
EMPHA
629KHZ
4.43MHZ
MAIN
CONVERTER
5.6MHZ
4.43MHZ
B.P.F
B.G
LP
SP
B.G
MESECAM
PB C
(SECAM)
PAL
B.P.F
BGP1
PB AMP
&
KILLER
KIL
BALANCER
PB C
(PAL)
AMP
COMB
DRIVER
AMP
PAL/SECAM
DET.
KILLER
KIL
1MHZ
L.P.F.
629KHZ
REC C
Q1151
PB H
ALWAYS 5V
PB 5V
Q1152
Q1013
DL101
COMB
FILTER
L1010,C1058
5.7MHZ
TRAP

VIDEO CIRCUIT



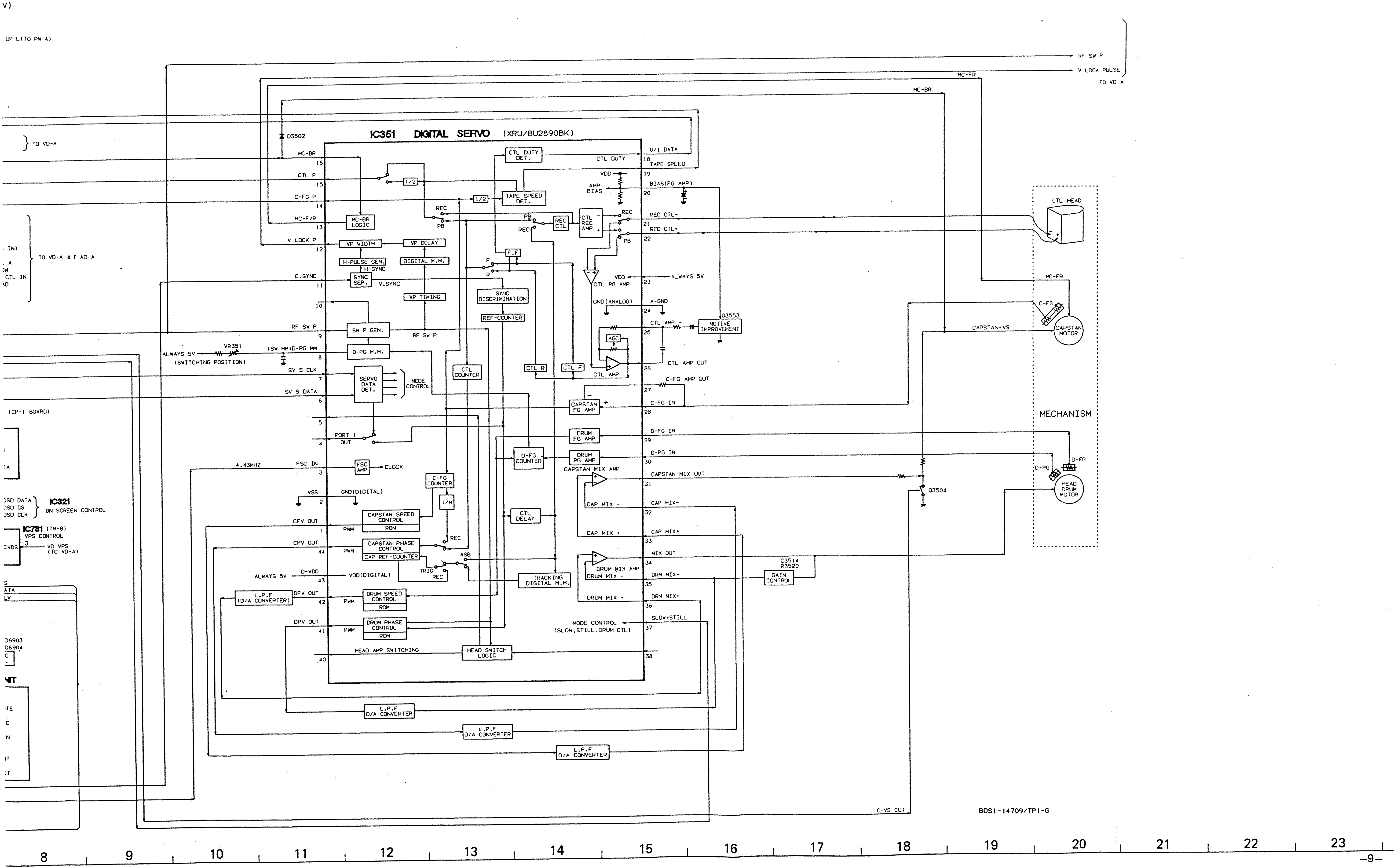
CCD 1H DELAY
8.86MHZ CLK
IC111 (LC89925)
CLOCK DRIVER
VSS
ALWAYS 5V
565.5bit CCD
CLAMP
(REC:YNR , PB:LNC OR DOC)
Q1011
PB 5V
PB LEVEL ADJ.
VR101
ALWAYS 12V
Q1101,Q1102
L1101,C1105-C1107
3.5MHZ L.P.F
PROCESS
345M)
WHP N.CAN
PB Y
FM DEMOD
SUB L.P.F
MAIN DEEMPHA
Q1002 Q1003
3.5MHZ L.P.F
CLAMP
VCA
1H DL Y
CORR
LIM
K
DOC
NOR
YNR OUT
REC Y
ATT
NL DEEMPHA
TO PIN8
WHP N.CAN
PICTURE COTROL
PB VIDEO
Y/C MIX
FBC
VD INSERT VIDEO AMP
EE VIDEO
PB Y
PB C
DOC SW
PB/REC SW
AGC CONTROL
AGC DET.
SYNC SEP.
SYNC OUT
C.SYNC
6dB AMP
L.P.F
NL EMPHA
DETAL EMPHA
1/2fH CAR.SHIFT
AGC CTL
VIDEO AGC AMP
AGC VIDEO
EE MONITER VIDEO
EE VIDEO
PB CHROMA
SP/LP SW
VIDEO INPUT
REC C
SYNC
HALF H KILLER
BGP GEN.
BGP OUT
BGP1 BGP2
BGP1,BGP2
KILLER DET.
ID-DET.
KIL
1/2
321fH VCO
SLD
REC AFC
PB APC
X2
4PHASE SHIFTER
629KHZ
4.43MHZ fsc
5.6MHZ B.P.F
5.6MHZ
SUB CONVERTER
4.43MHZ
R1032,R1033
C1036-C1038
321 fH VCO FILTER
8.86MHZ
ACC DET.
ACC AMP
B.G
BURST EMPHA
MAIN CONVERTER
4.43MHZ B.P.F
LP
SP
MESECAM
PB C (SECAM)
PB C (PAL)
PAL
B.P.F
PB AMP & KILLER
BALANCER
AMP
3RD LOCK PROTECT
REC APC DET.
Q1313 C1311
VCO CONTROL
Q1312
APC MUTE
STILL+SLOW
XO
VXO
APC FILTER
KILLER
1MHZ L.P.F.
COMB DRIVER AMP
PAL/SECAM DET.
Q1151
PB H
Q1013
ALWAYS 5V
PB 5V
Q1152
DL101
COMB FILTER
L1010,C1058
5.7MHZ TRAP
X1001
4.43MHZ
Q1012
BUFF.
4.43MHZ fsc TO SERVO
C.CYNC TO SERVO
V-LOCK PULSE(VD)
VIDEO OUT TO RF UNIT
IC321 (LC74760)
ON-SCREEN CONTROL
D3201 D3202 D3201 D3202
HALF TONE
H TONE
V IN
CV VIDEO
OSC1
OSC2
SCK
CS
SIN
X3201
17.73MHZ
Q3203
Q1601
BUFFER
AV(CN161) VIDEO OUT
OSD CLK
OSD CS
OSD DATA
TO IC301
VIDEO OUTPUT
BDV1-14709/TP1-G
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24

SYSTEM CONTROL & SERVO CIRCUIT



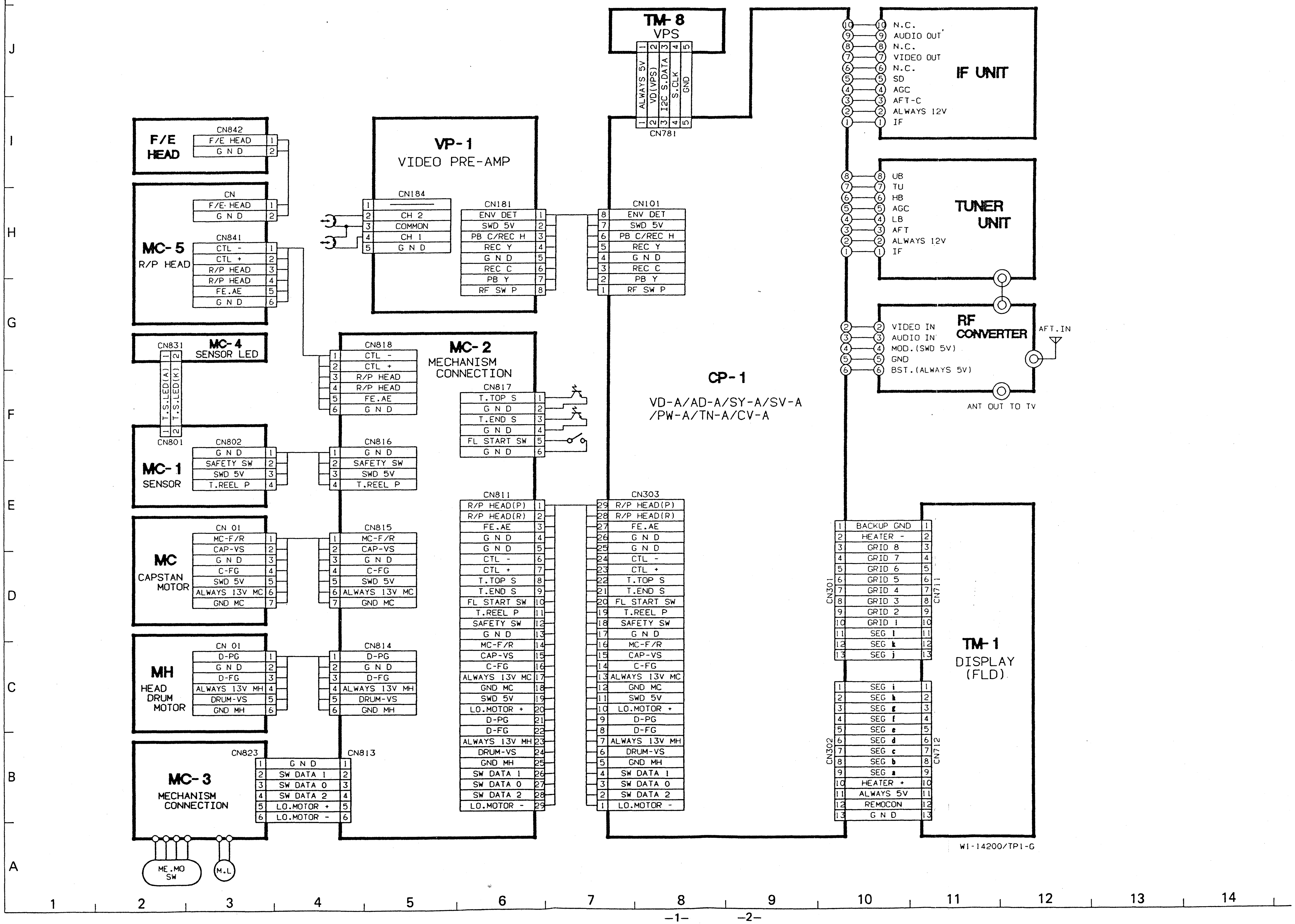
IC301 MPU (CP-1 BOARD)
SYSTEM CONTROL, (LC866648V)
TIMER, TUNING CONTROL
POWER UP
POWER UP L(TO PW-A)
CF1
CF2
CLK1
CLK2
X3001 13.92MHZ
X3002 32KHZ
PB-Y IN
ENV DET(VP-1)
ENV.
BACK UP 5V
BACK UP 5V (VDD)
T SPEED
0/1 DATA
IC303
INITIALIZE RESET
RESET
ANT/VTR (AV-CTL)
ANT/VTR
TO VD-A
MC-BR
CTL P
C-FG P
IC302
MECHANISM
LOADING MOTOR
ML
LOADING MOTOR DRIVER
ML-F
ML-R
ML-L
ML-M
D3002
D3001
D3003
A MUTE
PB H
REC H
AV L (FSS IN)
INPUT SEL A
STILL+SLOW
W.ASP/AV CTL IN
REC 12V AD
TO VD-A or AD-A
ERASE PREVENTION SWITCH
SAFETY SW
MECHANISM MODE SWITCH
ROTARY SW
SW DATA 0-2
S.PLAY
TAKE-UP REEL SENSOR
T REEL S.
RF SW P
CAP P
DRUM UP
C-VS CUT
SS+DRUM SHIFT
C-VS CUT
SV.S.CLK
SV.S.DATA
TAPE TOP SENSOR
TAPE END LED
TAPE END SENSOR
T.TOP-S
T.END-S
FL START SW
IC602 (CP-1 BOARD)
ROM
S.CLK
I2C S.DATA
ALWAYS -23V
OPERATION KEY-MATRIX
KEY IN 0 ~ KEY IN 3
KEY IN 0
KEY IN 1
KEY IN 2
KEY IN 3
S.DATA
OSD CS
OSD DATA
OSD CS
OSD CLK
IC321
ON SCREEN CONTROL
a ~ j (KEY SCAN)
ALWAYS 5V
POWER DOWN
IC781 (TM-8)
VPS CONTROL
SDA
SCL
CVBS
VD VPS (TO VD-A)
A7101 (TM-1 BOARD)
DISPLAY (FLD)
SEG a
SEG 1
SEGMENT
G1 ~ G8
GRID
HEATER AC+
G8
G1
PWM/CE
PLL/S.DATA
PLL CLK
PLL CS
PLL DATA
PLL CLK
RR711 (TM-1 BOARD)
IR REMOTE CONTROL RECEIVER
REMOCON
TUNER UNIT.
ANT
IN
TU
PWM DET.
PWM/CE
Q6921(TN-A)
R6923-R6927
C6924-C6925
TUNER PWM
H SYNC
D6901-D6903
D6901-D6904
SYNC DET.
IC691 (TN-A)
UB
HB
LB
BAND 1
BAND 2
CE
CLK
DATA
AFT
IF
AGC
Q6001
Q6004
AFT SW
AFT MUTE
AFT C
IF-UNIT
SD
A MUTE
AFT C
IF IN
AGC
V.OUT
A.OUT
Q6002
BUFFER
VIDEO OUT(TO VD-A)
AUDIO OUT(TO AD-A)
C.SYNC IN(TO VD-A)
FSC IN(TO VD-A)
D3502
IC351 DIGITAL SERVO (XRU/BU2890BK)
MC-BR
CTL P
C-FG P
MC-F/R
V LOCK P
C.SYNC
RF SW P
ALWAYS 5V
VR351
(SWITCHING POSITION)
(SW MM)D-PG MM
SV S CLK
SV S DATA
PORT 1 OUT
4.43MHZ
FSC IN
VSS
GND(DIGITAL)
CFV OUT
CPV OUT
ALWAYS 5V
D-VDD
VDD(DIGITAL)
L.P.F (D/A CONVERTER)
DFV OUT
DPV OUT
HEAD AMP SWITCHING
MC-BR LOGIC
1/2
VP WIDTH
VP DELAY
H-PULSE GEN.
H-SYNC
DIGITAL M.M.
SYNC SEP.
V.SYNC
VP TIMING
SW P GEN.
RF SW P
D-PG M.M.
SERVO DATA DET.
MODE CONTROL
FSC AMP
CLOCK
CAPSTAN SPEED CONTROL
ROM
PWM
CAPSTAN PHASE CONTROL
CAP REF-COUNTER
DRUM SPEED CONTROL
DRUM PHASE CONTROL
TRIG
REC
ASB
C-FG COUNTER
1/M
CTL COUNTER
HEAD SWITCH LOGIC
CTL DUTY DET.
TAPE SPEED DET.
F.F
SYNC DISCRIMINATION
REF-COUNTER
D-FG COUNTER
CTL DELAY
TRACKING DIGITAL M.M.
CTL R
CTL F
REC CTL
CTL REC AMP
PB
CTL PB AMP
VDD
AGC
CTL AMP
CAPSTAN FG AMP
DRUM FG AMP
DRUM PG AMP
CAPSTAN MIX AMP
CAP MIX -
CAP MIX +
DRUM MIX AMP
DRUM MIX -
DRUM MIX +
MODE CONTROL (SLOW,STILL,DRUM CTL)
0/1 DATA
CTL DUTY
TAPE SPEED
BIAS(FG AMP)
AMP BIAS
REC CTL-
REC CTL+
ALWAYS 5V
GND(ANALOG)
A-GND
CTL AMP
Q3553
MOTIVE IMPROVEMENT
CTL AMP OUT
C-FG AMP OUT
C-FG IN
D-FG IN
D-PG IN
CAPSTAN-MIX OUT
CAP MIX-
CAP MIX+
MIX OUT
DRM MIX-
DRM MIX+
SLOW+STILL
L.P.F D/A CONVERTER
K
J
I
H
G
F
E
D
C
B
A
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16

SYSTEM CONTROL & SERVO CIRCUIT

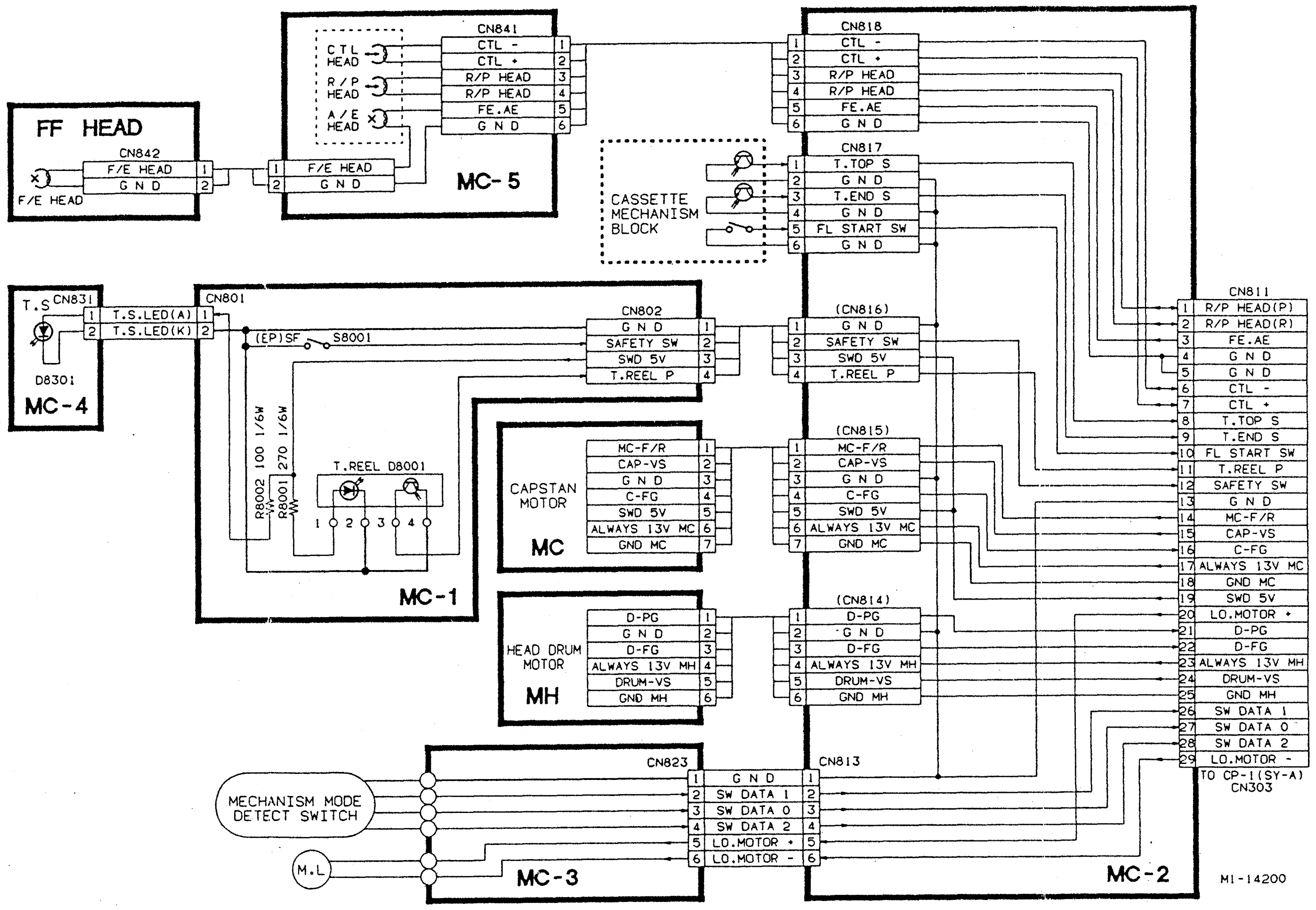

IC351 DIGITAL SERVO (XRU/BU2890BK)
RF SW P
V LOCK PULSE
TO VD-A
MC-FR
MC-BR
D3502
TO VD-A
MC-BR
CTL P
C-FG P
MC-F/R
V LOCK P
C.SYNC
RF SW P
TO VD-A & AD-A
ALWAYS 5V
VR351
(SW MH)D-PG MM
(SWITCHING POSITION)
SV S CLK
SV S DATA
(CP-1 BOARD)
4.43MHZ
FSC IN
VSS
GND(DIGITAL)
IC321
ON SCREEN CONTROL
OSD DATA
OSD CS
OSD CLK
IC781 (TM-8)
VPS CONTROL
CVBS
VD VPS
(TO VD-A)
CFV OUT
CPV OUT
ALWAYS 5V
D-VDD
VDD(DIGITAL)
L.P.F
(D/A CONVERTER)
DFV OUT
DPV OUT
HEAD AMP SWITCHING
D6903
D6904
MC-BR LOGIC
VP WIDTH
VP DELAY
H-PULSE GEN.
H-SYNC
DIGITAL M.M.
SYNC SEP.
V.SYNC
VP TIMING
SW P GEN.
RF SW P
D-PG M.M.
SERVO DATA DET.
MODE CONTROL
PORT 1 OUT
FSC AMP
CLOCK
CTL DUTY DET.
CTL DUTY
1/2
TAPE SPEED DET.
REC
PB
REC CTL
CTL REC AMP
F.F
SYNC DISCRIMINATION
REF-COUNTER
CTL COUNTER
CTL R
CTL F
D-FG COUNTER
C-FG COUNTER
1/M
CTL DELAY
CAPSTAN SPEED CONTROL
ROM
PWM
CAPSTAN PHASE CONTROL
CAP REF-COUNTER
TRIG
ASB
TRACKING DIGITAL M.M.
DRUM SPEED CONTROL
DRUM PHASE CONTROL
HEAD SWITCH LOGIC
VDD
AMP BIAS
CTL PB AMP
GND(ANALOG)
AGC
CTL AMP
CAPSTAN FG AMP
DRUM FG AMP
DRUM PG AMP
CAPSTAN MIX AMP
CAP MIX -
CAP MIX +
DRUM MIX AMP
DRUM MIX -
DRUM MIX +
MODE CONTROL
(SLOW,STILL,DRUM CTL)
0/1 DATA
TAPE SPEED
BIAS(FG AMP)
REC CTL-
REC CTL+
ALWAYS 5V
A-GND
CTL AMP
CTL AMP OUT
C-FG AMP OUT
C-FG IN
D-FG IN
D-PG IN
CAPSTAN-MIX OUT
CAP MIX-
CAP MIX+
MIX OUT
DRM MIX-
DRM MIX+
SLOW+STILL
Q3553
MOTIVE IMPROVEMENT
Q3504
C3514
R3520
GAIN CONTROL
CAPSTAN-VS
C-VS CUT
CTL HEAD
MC-FR
C-FG
CAPSTAN MOTOR
MECHANISM
D-PG
D-FG
HEAD DRUM MOTOR
L.P.F
D/A CONVERTER
BDS1-14709/TP1-G
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23

1. OVERALL WIRING,MECHANISM CONNECTION, & BLOCK DIAGRAMS

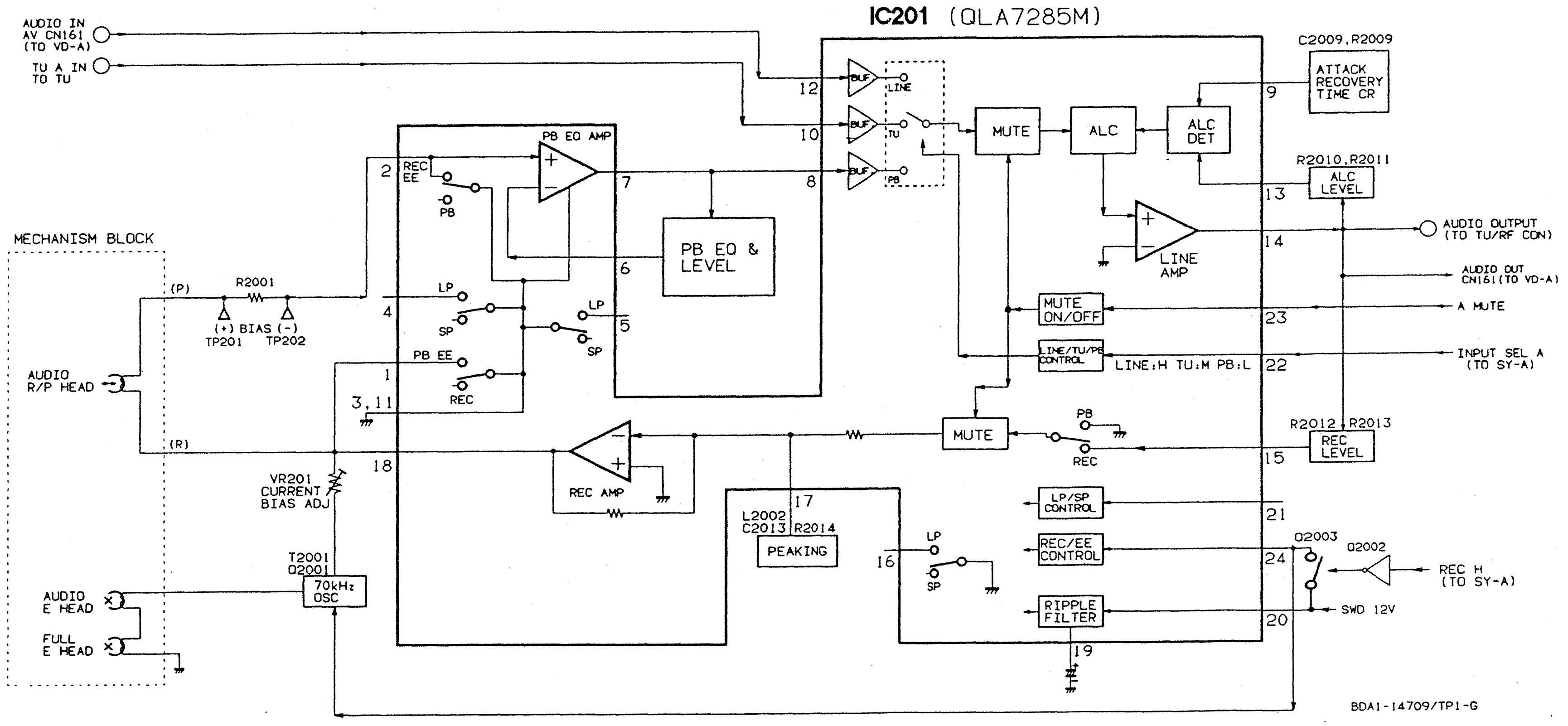
OVERALL WIRING


TM-8
VPS
CN781
ALWAYS 5V
VD(VPS)
I2C S.DATA
S.CLK
GND
IF UNIT
N.C.
AUDIO OUT
N.C.
VIDEO OUT
N.C.
SD
AGC
AFT-C
ALWAYS 12V
IF
TUNER UNIT
UB
TU
HB
AGC
LB
AFT
ALWAYS 12V
IF
RF CONVERTER
VIDEO IN
AUDIO IN
MOD.(SWD 5V)
GND
BST.(ALWAYS 5V)
AFT.IN
ANT OUT TO TV
F/E HEAD
CN842
F/E HEAD
G N D
MC-5
R/P HEAD
CN
F/E HEAD
G N D
CN841
CTL -
CTL +
R/P HEAD
R/P HEAD
FE.AE
G N D
MC-4
SENSOR LED
CN831
CN801
T.S.LED(A)
T.S.LED(K)
MC-1
SENSOR
CN802
G N D
SAFETY SW
SWD 5V
T.REEL P
MC
CAPSTAN MOTOR
CN 01
MC-F/R
CAP-VS
G N D
C-FG
SWD 5V
ALWAYS 13V MC
GND MC
MH
HEAD DRUM MOTOR
CN 01
D-PG
G N D
D-FG
ALWAYS 13V MH
DRUM-VS
GND MH
MC-3
MECHANISM CONNECTION
CN823
CN813
G N D
SW DATA 1
SW DATA 0
SW DATA 2
LO.MOTOR +
LO.MOTOR -
ME.MO SW
M.L
VP-1
VIDEO PRE-AMP
CN184
CH 2
COMMON
CH 1
G N D
CN181
ENV DET
SWD 5V
PB C/REC H
REC Y
G N D
REC C
PB Y
RF SW P
MC-2
MECHANISM CONNECTION
CN818
CTL -
CTL +
R/P HEAD
R/P HEAD
FE.AE
G N D
CN817
T.TOP S
G N D
T.END S
G N D
FL START SW
G N D
CN816
G N D
SAFETY SW
SWD 5V
T.REEL P
CN815
MC-F/R
CAP-VS
G N D
C-FG
SWD 5V
ALWAYS 13V MC
GND MC
CN814
D-PG
G N D
D-FG
ALWAYS 13V MH
DRUM-VS
GND MH
CN811
R/P HEAD(P)
R/P HEAD(R)
FE.AE
G N D
G N D
CTL -
CTL +
T.TOP S
T.END S
FL START SW
T.REEL P
SAFETY SW
G N D
MC-F/R
CAP-VS
C-FG
ALWAYS 13V MC
GND MC
SWD 5V
LO.MOTOR +
D-PG
D-FG
ALWAYS 13V MH
DRUM-VS
GND MH
SW DATA 1
SW DATA 0
SW DATA 2
LO.MOTOR -
CP-1
VD-A/AD-A/SY-A/SV-A
/PW-A/TN-A/CV-A
CN101
ENV DET
SWD 5V
PB C/REC H
REC Y
G N D
REC C
PB Y
RF SW P
CN303
CN301
BACKUP GND
HEATER -
GRID 8
GRID 7
GRID 6
GRID 5
GRID 4
GRID 3
GRID 2
GRID 1
SEG l
SEG k
SEG j
CN302
SEG i
SEG h
SEG g
SEG f
SEG e
SEG d
SEG c
SEG b
SEG a
HEATER +
ALWAYS 5V
REMOCON
G N D
CN711
CN712
TM-1
DISPLAY
(FLD)
WI-14200/TP1-G
K
J
I
H
G
F
E
D
C
B
A
1
2
3
4
5
6
7
8
9
10
11
12
13
14

MECHANISM CONNECTION

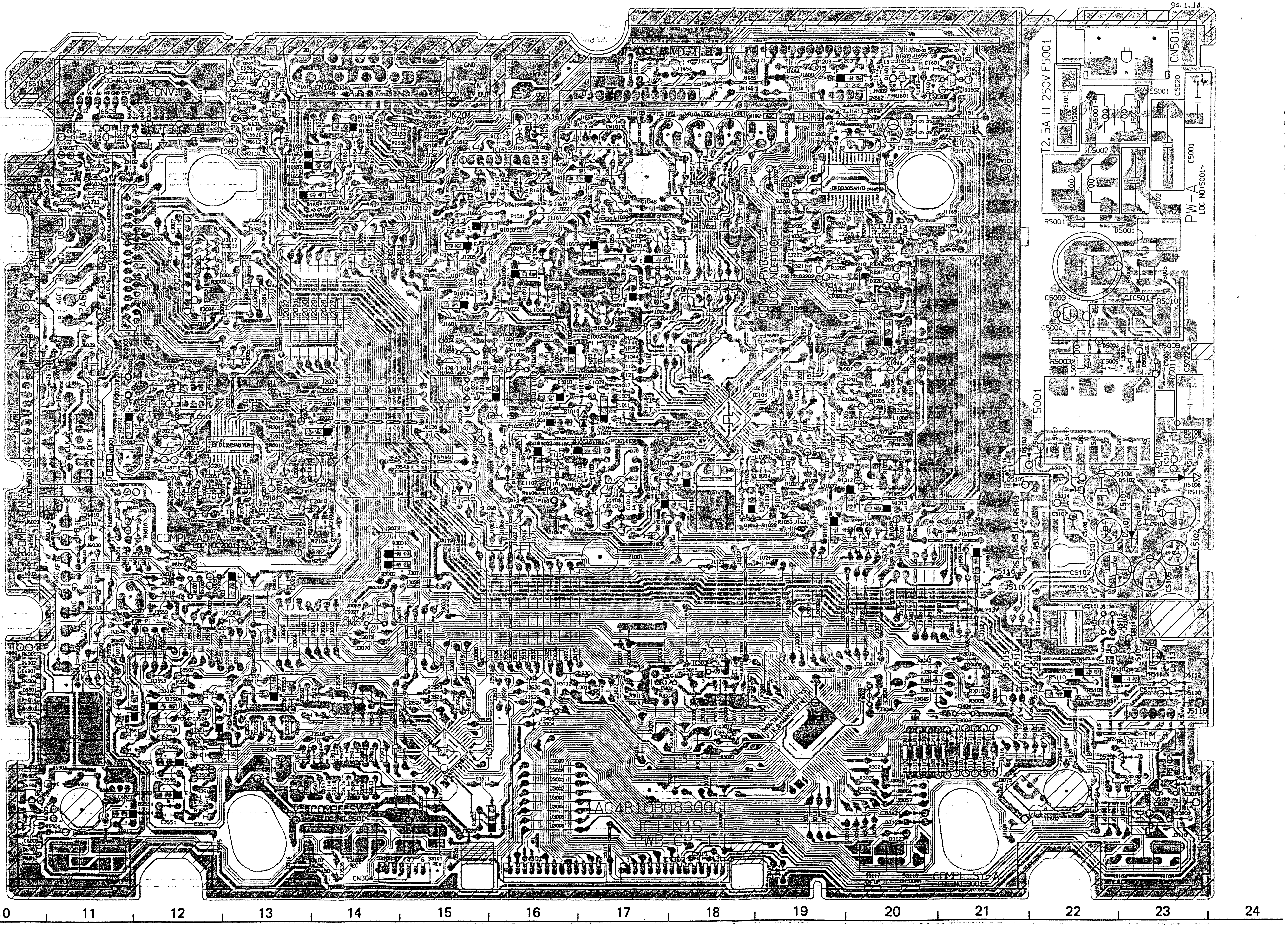

FF HEAD
CN842
F/E HEAD
G N D
F/E HEAD
CTL HEAD
R/P HEAD
A/E HEAD
CN841
CTL -
CTL +
R/P HEAD
R/P HEAD
FE.AE
G N D
F/E HEAD
G N D
MC-5
CASSETTE MECHANISM BLOCK
T.S
CN831
T.S.LED(A)
T.S.LED(K)
D8301
MC-4
CN801
(EP)SF
S8001
CN802
G N D
SAFETY SW
SWD 5V
T.REEL P
R8002 100 1/6W
R8001 270 1/6W
T.REEL D8001
1 2 3 4
MC-1
CAPSTAN MOTOR
MC
MC-F/R
CAP-VS
G N D
C-FG
SWD 5V
ALWAYS 13V MC
GND MC
HEAD DRUM MOTOR
MH
D-PG
G N D
D-FG
ALWAYS 13V MH
DRUM-VS
GND MH
MECHANISM MODE DETECT SWITCH
M.L
CN823
G N D
SW DATA 1
SW DATA 0
SW DATA 2
LO.MOTOR +
LO.MOTOR -
MC-3
CN818
CTL -
CTL +
R/P HEAD
R/P HEAD
FE.AE
G N D
CN817
T.TOP S
G N D
T.END S
G N D
FL START SW
G N D
(CN816)
G N D
SAFETY SW
SWD 5V
T.REEL P
(CN815)
MC-F/R
CAP-VS
G N D
C-FG
SWD 5V
ALWAYS 13V MC
GND MC
(CN814)
D-PG
G N D
D-FG
ALWAYS 13V MH
DRUM-VS
GND MH
CN813
G N D
SW DATA 1
SW DATA 0
SW DATA 2
LO.MOTOR +
LO.MOTOR -
MC-2
CN811
1 R/P HEAD(P)
2 R/P HEAD(R)
3 FE.AE
4 G N D
5 G N D
6 CTL -
7 CTL +
8 T.TOP S
9 T.END S
10 FL START SW
11 T.REEL P
12 SAFETY SW
13 G N D
14 MC-F/R
15 CAP-VS
16 C-FG
17 ALWAYS 13V MC
18 GND MC
19 SWD 5V
20 LO.MOTOR +
21 D-PG
22 D-FG
23 ALWAYS 13V MH
24 DRUM-VS
25 GND MH
26 SW DATA 1
27 SW DATA 0
28 SW DATA 2
29 LO.MOTOR -
TO CP-1(SY-A) CN303
M1-14200

AUDIO CIRCUIT

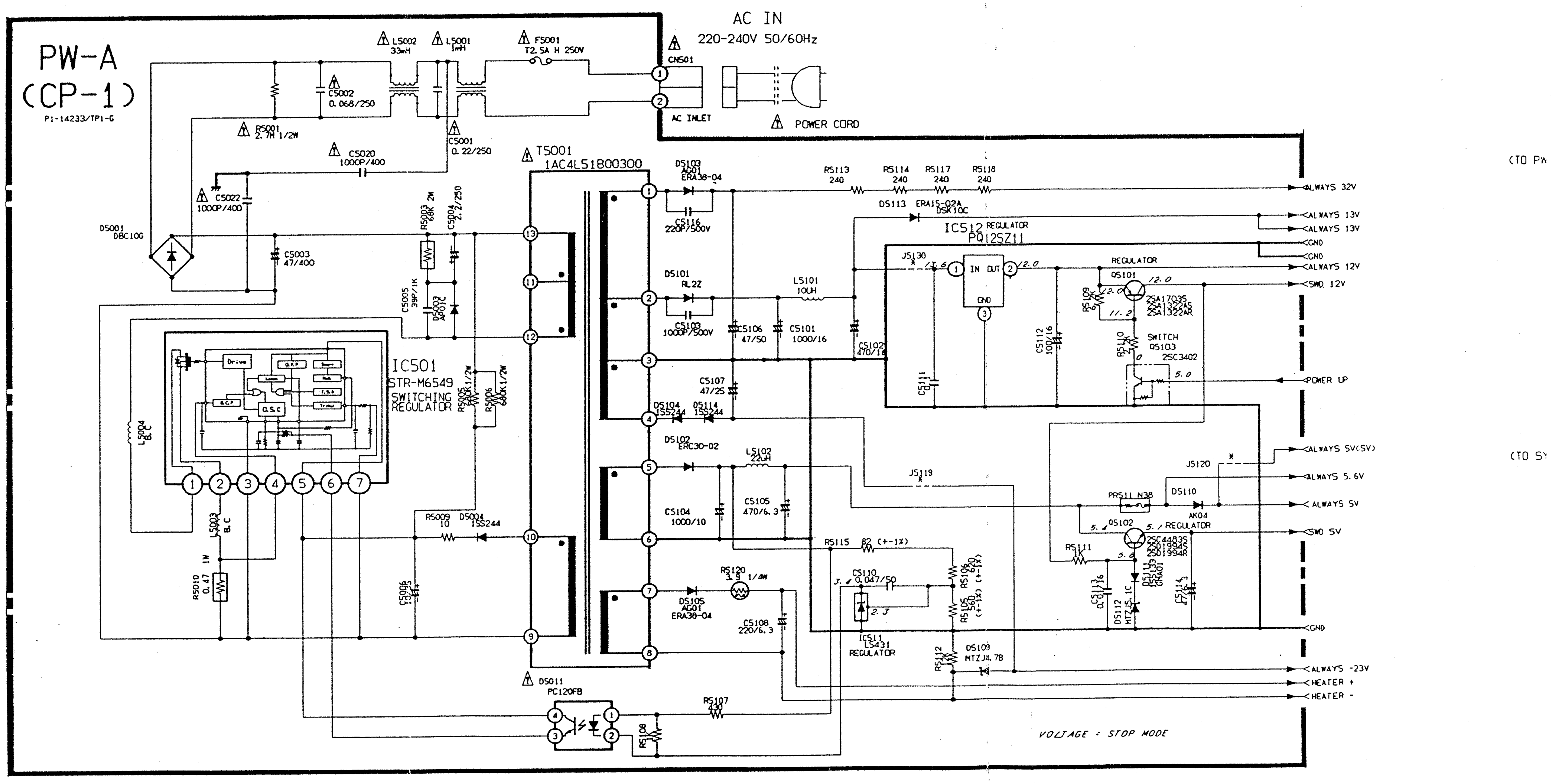

IC201 (QLA7285M)
AUDIO IN
AV CN161
(TO VD-A)
TU A IN
TO TU
MECHANISM BLOCK
(P)
(R)
R2001
(+) BIAS (-)
TP201
TP202
AUDIO
R/P HEAD
AUDIO
E HEAD
FULL
E HEAD
VR201
CURRENT
BIAS ADJ
T2001
Q2001
70kHz
OSC
PB EQ AMP
REC
EE
PB
LP
SP
PB EE
REC
3,11
PB EQ &
LEVEL
REC AMP
L2002
C2013
R2014
PEAKING
BUF
LINE
TU
PB
MUTE
ALC
ALC
DET
C2009,R2009
ATTACK
RECOVERY
TIME CR
R2010,R2011
ALC
LEVEL
LINE
AMP
AUDIO OUTPUT
(TO TU/RF CON)
AUDIO OUT
CN161(TO VD-A)
MUTE
ON/OFF
A MUTE
LINE/TU/PB
CONTROL
LINE:H TU:M PB:L
INPUT SEL A
(TO SY-A)
MUTE
PB
REC
R2012
R2013
REC
LEVEL
LP/SP
CONTROL
REC/EE
CONTROL
RIPPLE
FILTER
Q2003
Q2002
REC H
(TO SY-A)
SWD 12V
1
2
4
5
6
7
8
9
10
12
13
14
15
16
17
18
19
20
21
22
23
24
BDA1-14709/TP1-G
K
J
I
H
G
F
E
D
C
B
A
1
2
3
4
5
6
7
8
9

2. CIRCUIT DIAGRAMS & PRINTED WIRING BOARDS (P.W.B.)

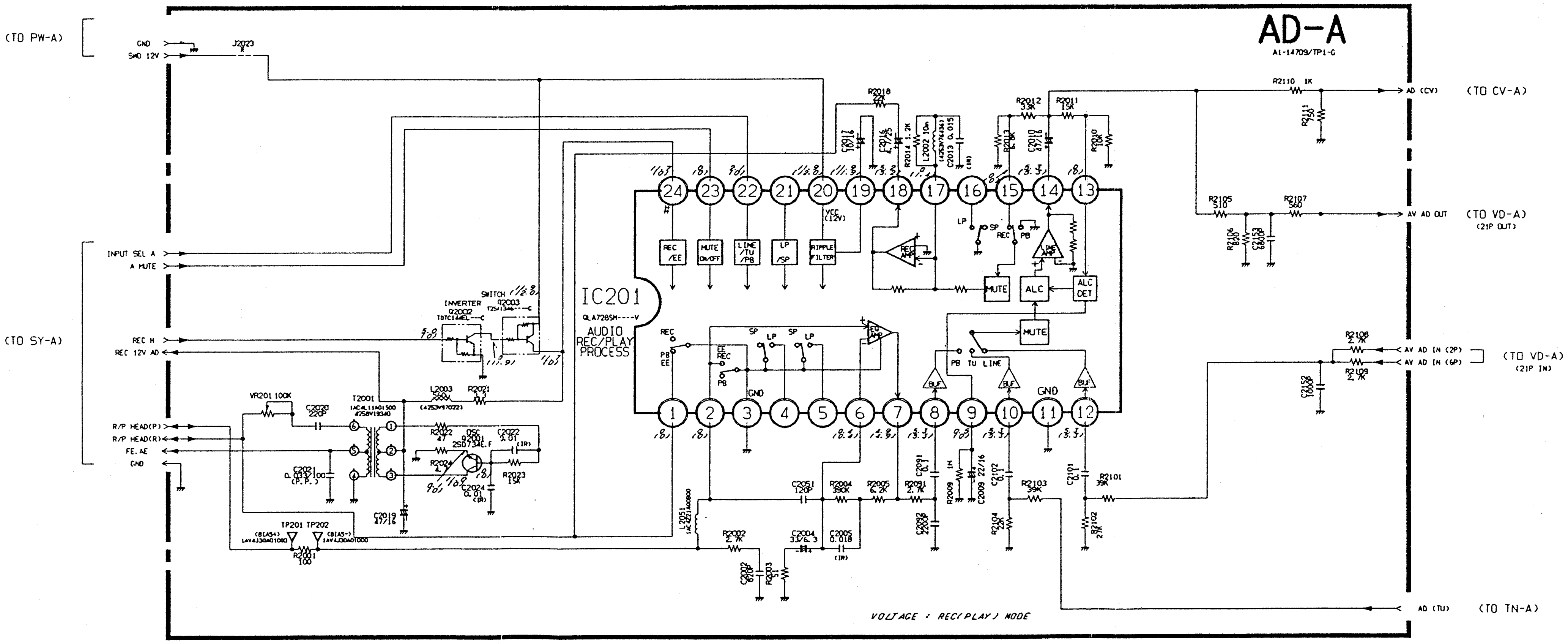
CP-1 P.W.B.


94.1.14
COMPL CV-A
LOC NO.6601~
CONV
CN5001
T2.5A H 250V F5001
PW-A
LOC NO.5001~
T5001
IC501
COMPL AD-A
LOC NO.2001~
COMPL IN-A
LOC NO.6001~
COMPL SV-A
LOC NO.3501~
COMPL SY-A
LOC NO.3001~
COMPL PWE VD-A
LOC NO.1001~
AC4B10B08300G
JCI N1S
PWB CP-1
CN304
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24

CP-1 BOARD (PW-A) POWER SUPPLY

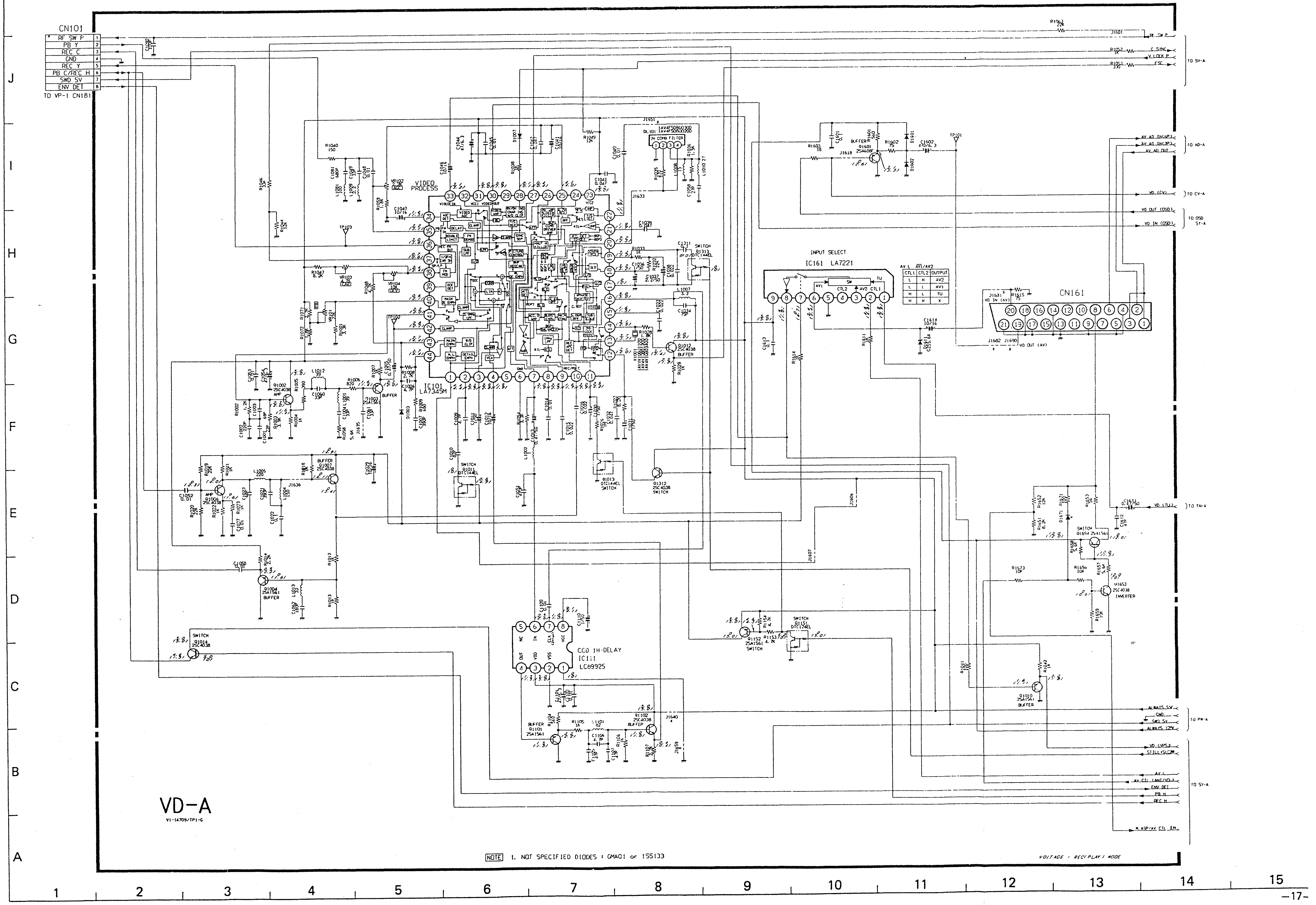

PW-A
(CP-1)
P1-14233/TP1-G
AC IN
220-240V 50/60Hz
CN501
AC INLET
POWER CORD
L5002 33mH
L5001 1mH
F5001 T2.5A H 250V
C5002 0.068/250
R5001 2.7M 1/2W
C5001 0.22/250
C5020 1000P/400
C5022 1000P/400
D5001 D8C10G
C5003 47/400
R5002 68K 2W
C5004 2.2/250
C5005 3mF/1K
D5002
T5001 1AC4L51B00300
IC501 STR-M6549 SWITCHING REGULATOR
Drive
O.S.C
L5004 B.C
L5003 B.C
R5010 0.47 1W
R5008
R5006
R5009 10
D5004 1SS244
C5006
D5011 PC120FB
R5107 430
R5108
D5103 AG01 ERA38-04
C5116 220P/500V
D5101 RL2Z
C5103 1000P/500V
C5106 47/50
L5101 10UH
C5101 1000/16
C5102 470/16
C5107 47/25
D5104 1SS244
D5114 1SS244
D5102 ERC30-02
L5102 22uH
C5104 1000/10
C5105 470/6.3
R5115 82 (+-1%)
R5120 1/4W
C5110 0.047/50
D5105 AG01 ERA38-04
C5108 220/6.3
IC511 L5431 REGULATOR
R5106 620 (+-1%)
R5105 560 (+-1%)
R5112 12K
D5109 MTZJ4.7B
R5113 240
R5114 240
R5117 240
R5118 240
D5113 ERA15-02A DSK10C
IC512 REGULATOR PQ12SZ11
J5130
IN OUT GND
13.6
12.0
C5111
C5112 100/16
REGULATOR
Q5101 2SA1703S 2SA1322AS 2SA1322AR
R5109
11.2
R5110 2.7K
SWITCH Q5103 2SC3402
5.0
J5119
J5120
PRS11 N38
D5110 AK04
Q5102 2SC4483S 2SD1994S 2SD1994R REGULATOR
5.4
5.1
5.6
R5111 1K
C5113 0.01/16
D5111 1SS133 GMA01
D5112 MTZJ5.1C
C5114 47/6.3
ALWAYS 32V
ALWAYS 13V
ALWAYS 13V
GND
GND
ALWAYS 12V
SWD 12V
POWER UP
ALWAYS 5V(SV)
ALWAYS 5.6V
ALWAYS 5V
SWD 5V
GND
ALWAYS -23V
HEATER +
HEATER -
VOLTAGE : STOP MODE
(TO PW
(TO S
K
J
I
H
G
F
E
D
C
B
A
1
2
3
4
5
6
7
8
9
10
11
12

CP-1 BOARD (AD-A) AUDIO


AD-A
A1-14709/TP1-G
(TO PW-A)
GND
SWD 12V
J2023
(TO SY-A)
INPUT SEL A
A MUTE
REC H
REC 12V AD
R/P HEAD(P)
R/P HEAD(R)
FE. AE
GND
IC201
QLA7285M----V
AUDIO
REC/PLAY
PROCESS
INVERTER
Q2002
SWITCH
Q2003
REC /EE
MUTE ON/OFF
LINE /TU /PB
LP /SP
RIPPLE FILTER
VCC (12V)
REC AMP
MUTE
ALC
ALC DET
LINE AMP
EQ AMP
BUF
PB TU LINE
GND
VR201 100K
T2001
L2003
R2021
OSC Q2001
TP201 TP202
R2001 100
R2110 1K
AD (CV)
(TO CV-A)
R2105 510
R2107 560
AV AD OUT
(TO VD-A)
(21P OUT)
R2108 2.7K
R2109 2.7K
AV AD IN (2P)
AV AD IN (6P)
(TO VD-A)
(21P IN)
AD (TU)
(TO TN-A)
VOLTAGE : REC(PLAY) MODE

12 13 14 15 16 17 18 19 20 21 22 23

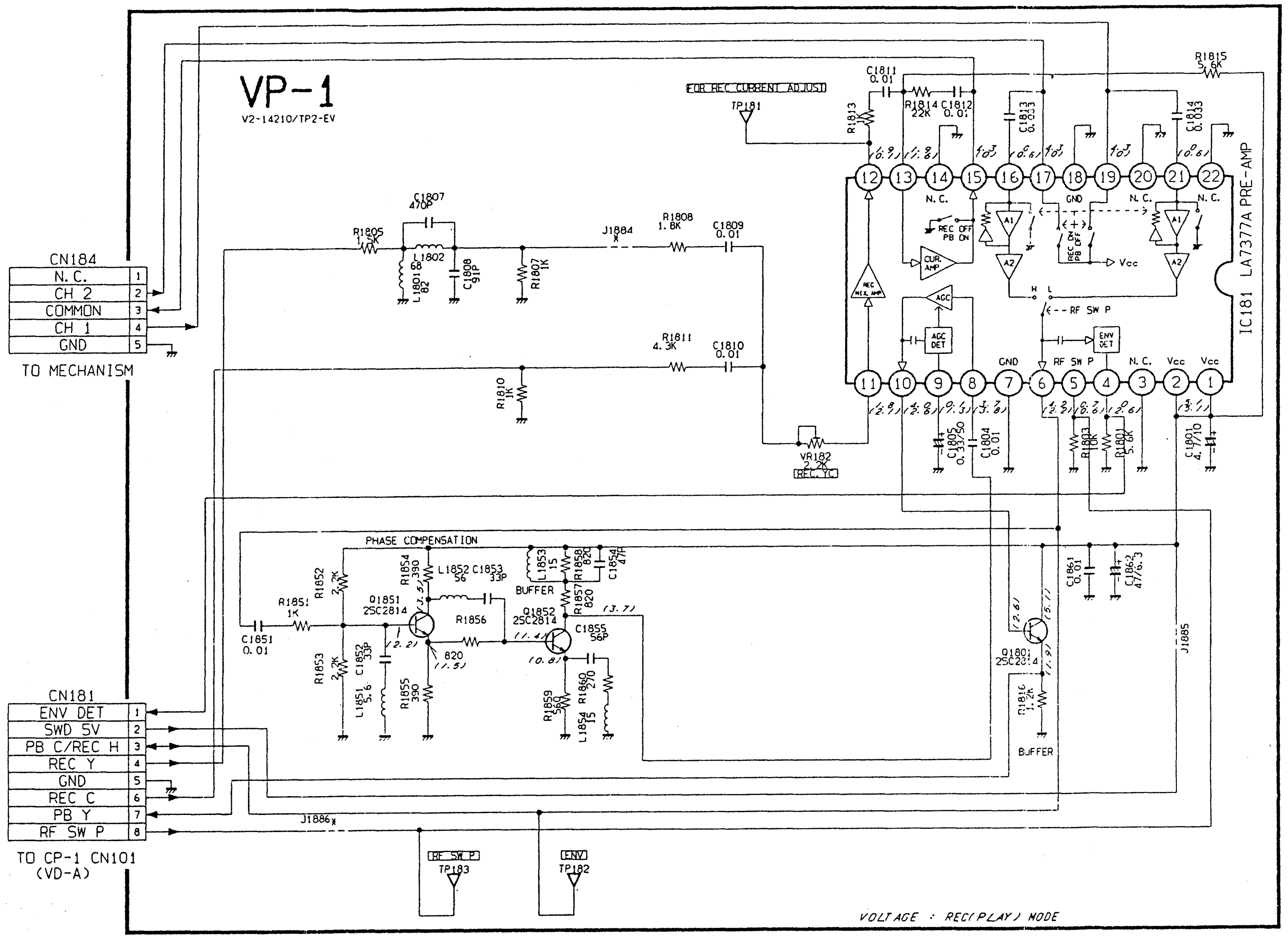
CP-1 BOARD (VD-A) VIDEO


CN101
RF SW P
PB Y
REC C
GND
REC Y
PB C/REC H
SWD 5V
ENV DET
TO VP-1 CN181
IC101
LA7345M
VIDEO PROCESS
IC161 LA7221
INPUT SELECT
CN161
CCD 1H-DELAY
IC111
LC89925
DL101
2H COMB FILTER
J1601
RF SW P
C SYNC
V LOCK P
FSC
TO SV-A
AV AD IN(VP)
AV AD IN(SP)
AV AD OUT
TO AD-A
VD (CV)
TO CV-A
VD OUT (OSD)
VD IN (OSD)
TO OSD SY-A
VD IN (AV)
VD OUT (AV)
VD (TU)
TO TN-A
ALWAYS 5V
GND
SWD 5V
ALWAYS 12V
TO PW-A
VD (VPS)
STILL/SLOW
AV L
AV CTL (AV1/AV2)
ENV DET
PB H
REC H
TO SY-A
R.ASP/AV CTL IN
Q1002 2SC4038 AMP
Q1003 2SA1561 BUFFER
Q1004 2SA1561 BUFFER
Q1005 2SC4038 AMP
Q1006 2SC4038 BUFFER
Q1011 DTC144EL SWITCH
Q1012 2SC4038 BUFFER
Q1013 DTC144EL SWITCH
Q1014 2SC4038 SWITCH
Q1010 2SA1561 BUFFER
Q1101 2SA1561 BUFFER
Q1102 2SC4038 BUFFER
Q1151 DTC124EL SWITCH
Q1152 2SA1561 SWITCH
Q1311 DTC144EL SWITCH
Q1312 2SC4038 SWITCH
Q1601 2SA1608F BUFFER
Q1652 2SC4038 INVERTER
Q1654 2SA1561 SWITCH
TP101
TP102
TP103
VD-A
V1-14709/TP1-G
K
J
I
H
G
F
E
D
C
B
A
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15

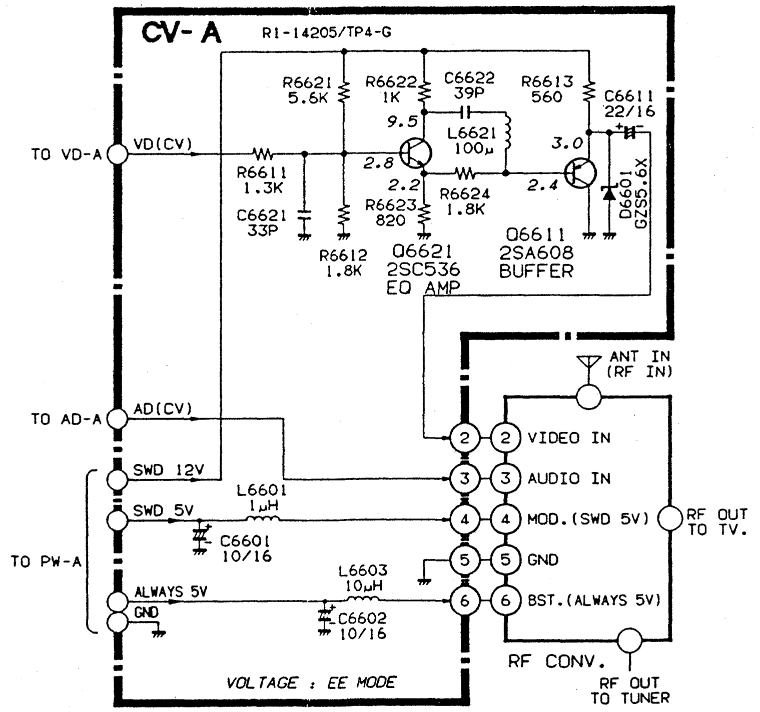
NOTE 1. NOT SPECIFIED DIODES : GMA01 or 1SS133

VOLTAGE : REC/PLAY/ MODE

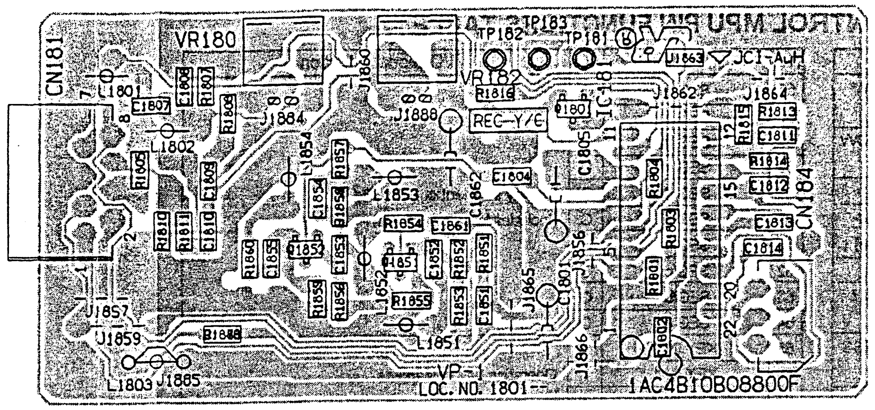
VP-1 BOARD VIDEO PRE-AMP


VP-1
V2-14210/TP2-EV
CN184
N. C.
CH 2
COMMON
CH 1
GND
TO MECHANISM
CN181
ENV DET
SWD 5V
PB C/REC H
REC Y
GND
REC C
PB Y
RF SW P
TO CP-1 CN101
(VD-A)
FOR REC CURRENT ADJUST
TP181
TP182
TP183
RF SW P
ENV
VR182 2.2K
REC Y/C
PHASE COMPENSATION
BUFFER
Q1851 2SC2814
Q1852 2SC2814
Q1801 2SC2814
IC181 LA7377A PRE-AMP
R1805
R1807 1K
R1808 1.8K
R1810 1K
R1811 4.3K
R1813
R1814 22K
R1815 5.6K
R1816
R1851 1K
R1852
R1853
R1854 390
R1855 390
R1856
R1857
R1858
R1859
R1860 270
C1807 470P
C1808
C1809 0.01
C1810 0.01
C1811 0.01
C1812 0.01
C1813 0.033
C1814 0.033
C1851 0.01
C1852
C1853 33P
C1854 47P
C1855 56P
C1861 0.01
C1862 47/6.3
L1801
L1802
L1851
L1852 56
L1853
L1854 15
J1884
J1885
J1886
820
N.C.
GND
Vcc
RF SW P
REC OFF PB ON
A1
A2
AGC
AGC DET
ENV DET
VOLTAGE : REC(PLAY) MODE

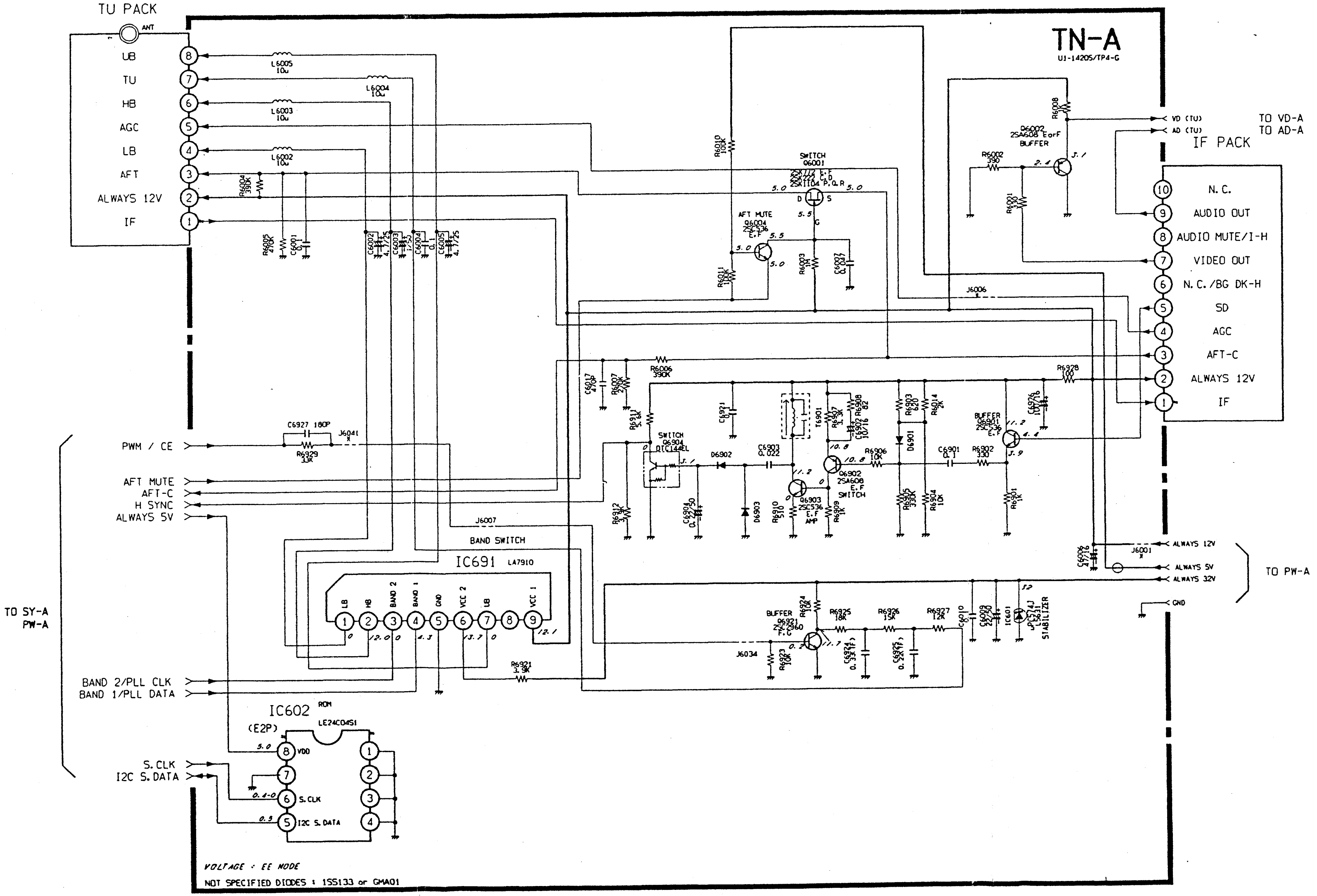
CP-1 BOARD (CV-A) RF CONVERTER CONNECTION


CV-A
R1-14205/TP4-G
TO VD-A
VD(CV)
TO AD-A
AD(CV)
TO PW-A
SWD 12V
SWD 5V
ALWAYS 5V
GND
R6611 1.3K
R6612 1.8K
R6613 560
R6621 5.6K
R6622 1K
R6623 820
R6624 1.8K
C6601 10/16
C6602 10/16
C6611 22/16
C6621 33P
C6622 39P
L6601 1μH
L6603 10μH
L6621 100μ
Q6621 2SC536 EQ AMP
Q6611 2SA608 BUFFER
D6601 GZS5.6X
9.5
2.8
2.2
3.0
2.4
ANT IN (RF IN)
VIDEO IN
AUDIO IN
MOD. (SWD 5V)
GND
BST. (ALWAYS 5V)
RF OUT TO TV.
RF CONV.
RF OUT TO TUNER
VOLTAGE : EE MODE

VP-1 P.W.B.


CN181
VR180
TP183
TP182
TP181
VR182
REC-Y/C
J1863
JC1-AdH
CN184
L1853
L1851
L1803
J1885
J1859
J1857
VP-1
LOC. NO. 1801
1AC4B10B08800F

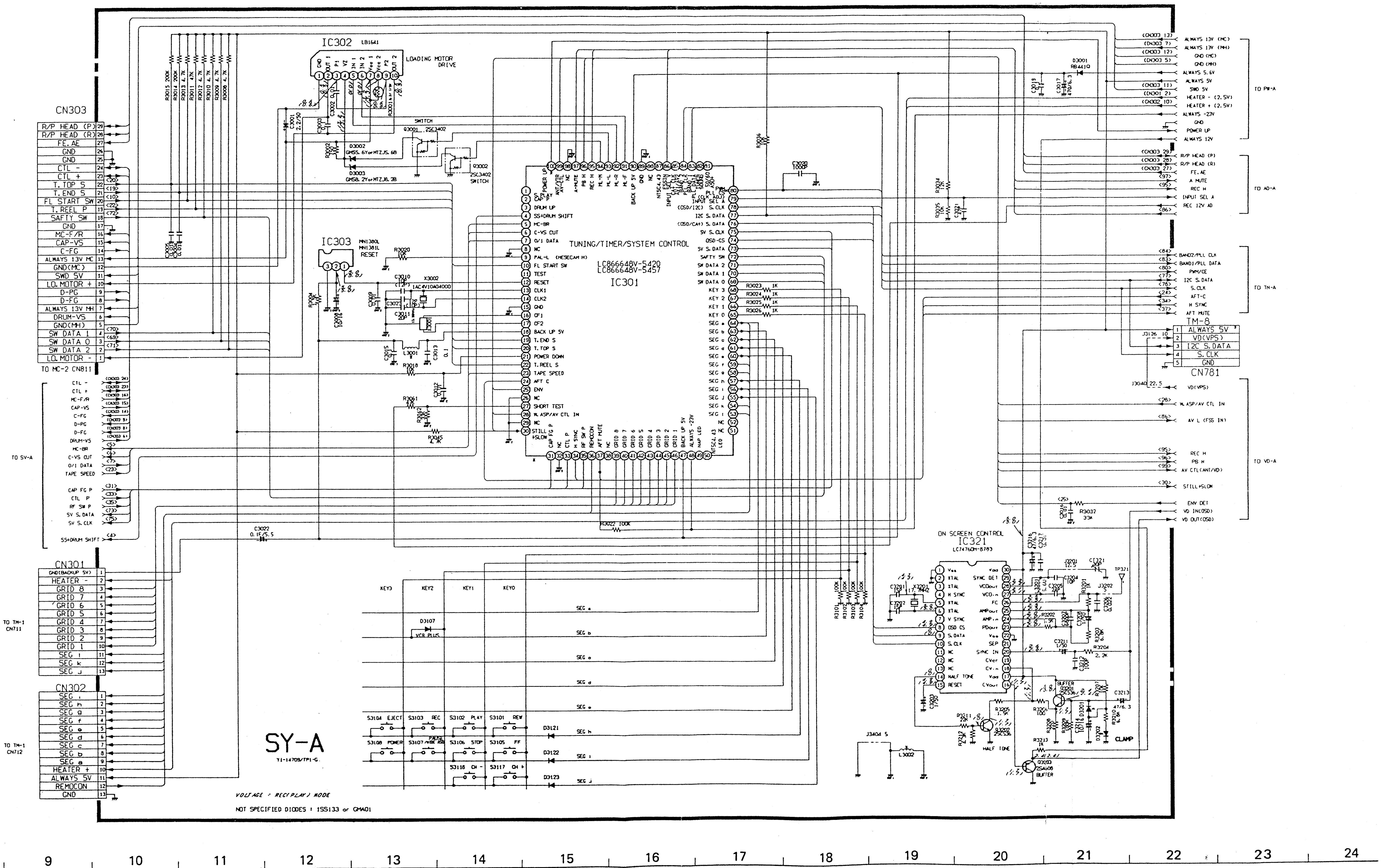
CP-1 BOARD (TN-A) TUNER IF CONNECTION


TU PACK
ANT
UB
TU
HB
AGC
LB
AFT
ALWAYS 12V
IF
L6005 10u
L6004 10u
L6003 10u
L6002 10u
R6004 390K
R6005 470K
C6001 0.1
C6002 4.7/25
C6003 1/50
C6004 0.1
C6005 4.7/25
TN-A
U1-1420S/TP4-G
R6010 100K
SWITCH
Q6001
2SK772 E.F
2SK222 C.D
2SK1104 P.Q.R
5.0
D
S
G
5.5
AFT MUTE
Q6004
2SC536
E.F
R6011 100K
R6003 1M
C6007 0.047
R6008 1K
Q6002
2SA608 EorF
BUFFER
R6002 390
R6001 330
2.4
3.1
VD (TU)
AD (TU)
TO VD-A
TO AD-A
IF PACK
N. C.
AUDIO OUT
AUDIO MUTE/I-H
VIDEO OUT
N. C./BG DK-H
SD
AGC
AFT-C
ALWAYS 12V
IF
J6006
C6017 470P
R6007 270K
R6006 390K
R6911 5.6K
C6921 0.1
T6901
R6907 3.3K
R6908 82
C6902 10/16
R6903 620
R6014 2K
D6901
R6928 100
C6926 100/16
BUFFER
Q6901
2SC536
E.F
11.2
4.4
3.9
SWITCH
Q6904
DTC144EL
3.1
D6902
C6903 0.022
10.8
R6906 10K
Q6902
2SA608
E.F
SWITCH
C6901 0.1
R6902 330
R6912 3.9K
C6904 0.22/50
D6903
R6910 510
Q6903
2SC536
E.F
AMP
R6909 1K
R6905 330K
R6904 10K
R6901 1K
PWM / CE
C6927 180P
R6929 33K
J6041
AFT MUTE
AFT-C
H SYNC
ALWAYS 5V
J6007
BAND SWITCH
IC691 LA7910
LB
HB
BAND 2
BAND 1
GND
VCC 2
LB
VCC 1
12.0
4.3
13.7
12.1
R6921 3.9K
TO SY-A
PW-A
BAND 2/PLL CLK
BAND 1/PLL DATA
IC602 ROM
(E2P)
LE24C04S1
VDD
S. CLK
I2C S. DATA
5.0
0.4-0
0.3
S. CLK
I2C S. DATA
C6006 47/16
J6001
ALWAYS 12V
ALWAYS 5V
ALWAYS 32V
GND
TO PW-A
R6924 10K
BUFFER
Q6921
2SC2960
F.G
0.2
11.7
R6925 18K
R6926 15K
R6927 12K
C6924 0.33(TF)
C6925 0.22(TF)
R6923 10K
J6034
C6010 0.1
C6009 22/50
IC601
uPC574J
L5631
STABILIZER
32

VOLTAGE : EE MODE

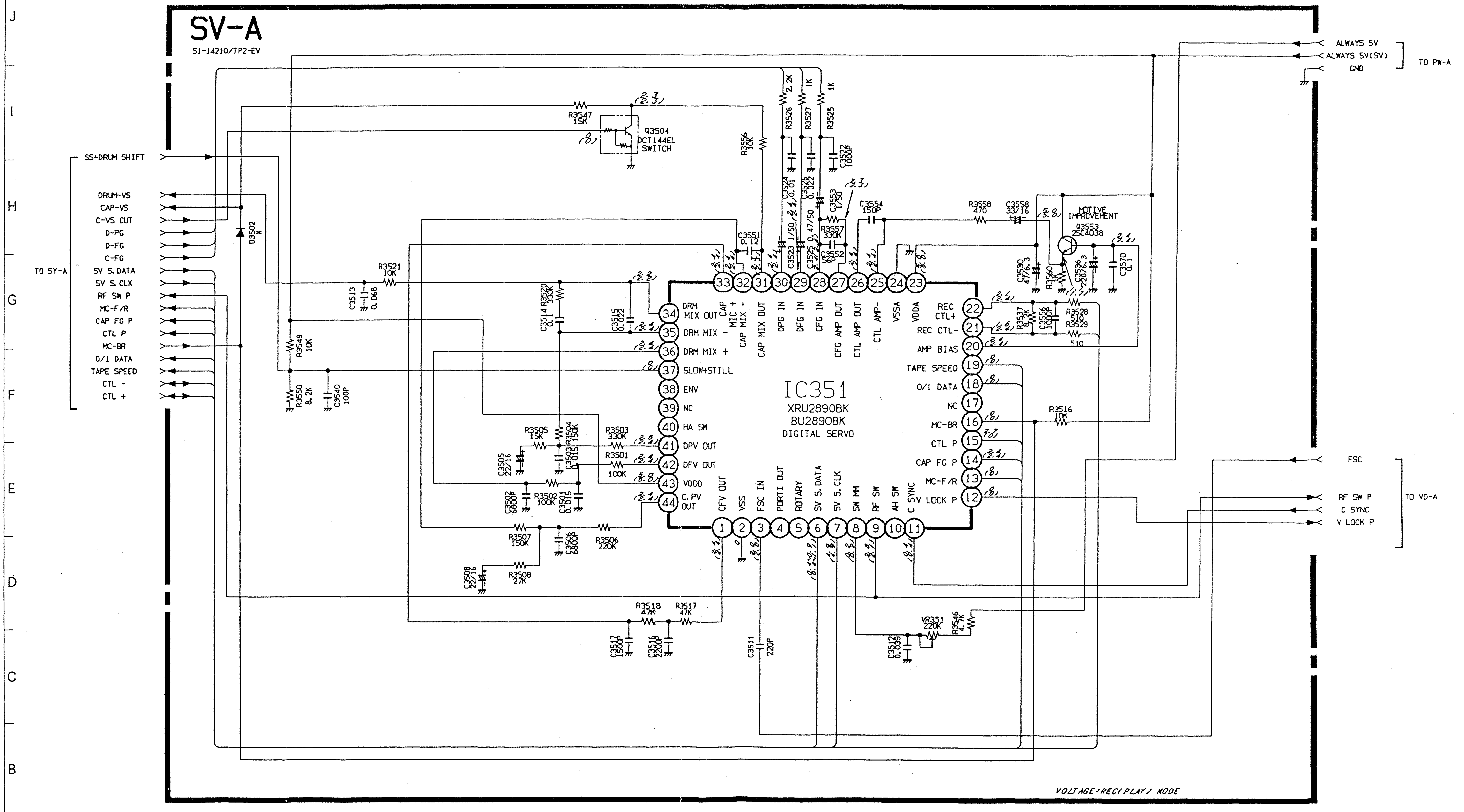
NOT SPECIFIED DIODES : 1SS133 or GMA01

CP-1 BOARD (SY-A) SYSTEM CONTROL

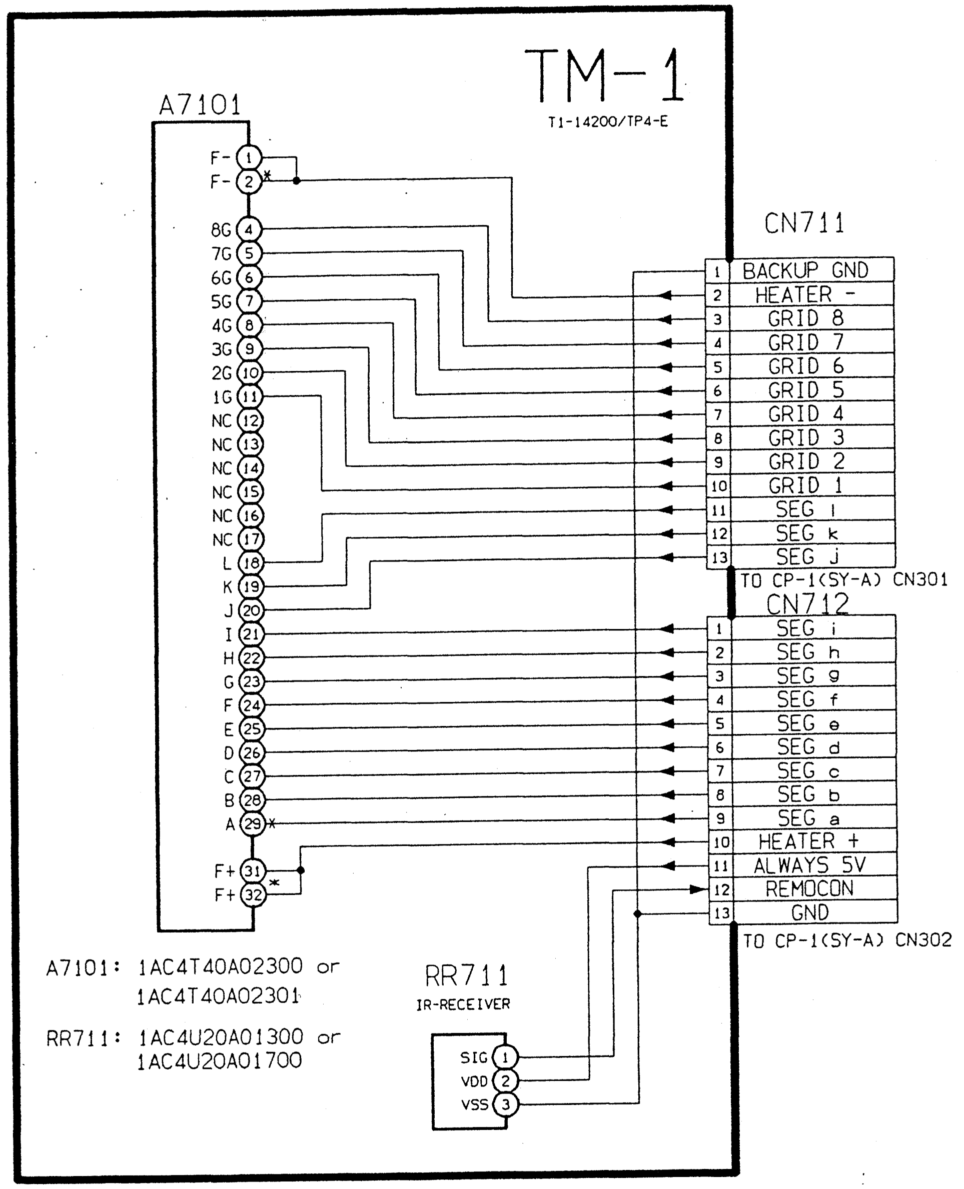


SY-A
YI-14709/TP1-G
IC301
LC866648V-5420
LC866648V-5457
TUNING/TIMER/SYSTEM CONTROL
IC302 LB1641
LOADING MOTOR DRIVE
IC303 MN1380L MN1381L RESET
ON SCREEN CONTROL
IC321 LC74760M-8783
CN303
R/P HEAD (P)
R/P HEAD (R)
FE. AE
GND
CTL -
CTL +
T. TOP S
T. END S
FL START SW
T. REEL P
SAFTY SW
MC-F/R
CAP-VS
C-FG
ALWAYS 13V MC
GND(MC)
SWD 5V
LD. MOTOR +
D-PG
D-FG
ALWAYS 13V MH
DRUM-VS
GND(MH)
SW DATA 1
SW DATA 0
SW DATA 2
LD. MOTOR -
TO MC-2 CN811
TO SV-A
CN301
GND(BACKUP 5V)
HEATER -
GRID 8
GRID 7
GRID 6
GRID 5
GRID 4
GRID 3
GRID 2
GRID 1
SEG i
SEG k
SEG j
TO TM-1 CN711
CN302
SEG h
SEG g
SEG f
SEG e
SEG d
SEG c
SEG b
SEG a
HEATER +
ALWAYS 5V
REMOCON
TO TM-1 CN712
TO PW-A
TO AD-A
TO TN-A
TO VD-A
CN781
TM-8
ALWAYS 5V
VD(VPS)
I2C S.DATA
S.CLK
CLAMP
BUFFER
HALF TONE
SWITCH
Q3001 2SC3402
Q3002 2SC3402
D3001 RB441Q
D3002 GMS5.6Y or MTZJ5.6B
D3003 GMS8.2Y or MTZJ8.2B
X3002
S3104 EJECT
S3103 REC
S3102 PLAY
S3101 REW
S3108 POWER
S3107 PAUSE
S3106 STOP
S3105 FF
S3118 CH -
S3117 CH +
KEY3
KEY2
KEY1
KEY0
D3107 VCR PLUS
D3121
D3122
D3123
VOLTAGE : REC(PLAY) MODE
NOT SPECIFIED DIODES : 1SS133 or GMA01
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24

CP-1 BOARD (SV-A) SERVO


SV-A
S1-14210/TP2-EV
SS+DRUM SHIFT
DRUM-VS
CAP-VS
C-VS CUT
D-PG
D-FG
C-FG
SV S. DATA
SV S. CLK
RF SW P
MC-F/R
CAP FG P
CTL P
MC-BR
0/1 DATA
TAPE SPEED
CTL -
CTL +
TO SY-A
ALWAYS 5V
ALWAYS 5V(5V)
GND
TO PW-A
FSC
RF SW P
C SYNC
V LOCK P
TO VD-A
IC351
XRU2890BK
BU2890BK
DIGITAL SERVO
DRM MIX OUT
DRM MIX -
DRM MIX +
SLOW+STILL
ENV
NC
HA SW
DPV OUT
DFV OUT
VDDD
C. PV OUT
CFV OUT
VSS
FSC IN
PORT1 OUT
ROTARY
SV S.DATA
SV S.CLK
SW MM
RF SW
AH SW
C SYNC
V LOCK P
MC-F/R
CAP FG P
CTL P
MC-BR
NC
0/1 DATA
TAPE SPEED
AMP BIAS
REC CTL-
REC CTL+
CAP MIC +
CAP MIX -
CAP MIX OUT
DPG IN
DFG IN
CFG IN
CFG AMP OUT
CTL AMP OUT
CTL AMP-
VSSA
VDDA
Q3504
DCT144EL
SWITCH
R3547 15K
R3556 15K
R3526 2.2K
R3527 1K
R3525 1K
C3524 0.01
C3528 0.022
C3553 1/50
C3522 1000P
C3523 1/50
C3529 0.47/50
C3557 330K
C3552 56P
C3551 0.12
C3554 150P
R3558 470
C3558 33/16
MOTIVE IMPROVEMENT
Q3553 2SC4038
C3530 47/6.3
R3560
C3536 220/6.3
C3570 0.1
R3537 8.2K
C3556 1000P
R3528 510
R3529 510
R3521 10K
C3513 0.068
R3520 330K
C3514 0.1
C3515 0.022
R3549 10K
R3550 8.2K
C3540 100P
D3502
R3505 15K
R3504 150K
C3503 0.015
R3503 330K
R3501 100K
C3505 22/16
C3502 6800P
R3502 100K
C3501 0.015
R3507 150K
C3506 6800P
R3506 220K
C3509 22/16
R3508 27K
R3516 10K
R3518 47K
R3517 47K
C3517 1500P
C3516 2200P
C3511 220P
C3512 0.039
VR351 220K
R3546 4.7K
(3.3)
(8)
(2.4)
(3.1)
(0)
VOLTAGE: REC(PLAY) MODE

TM-1 BOARD DISPLAY (FLD)

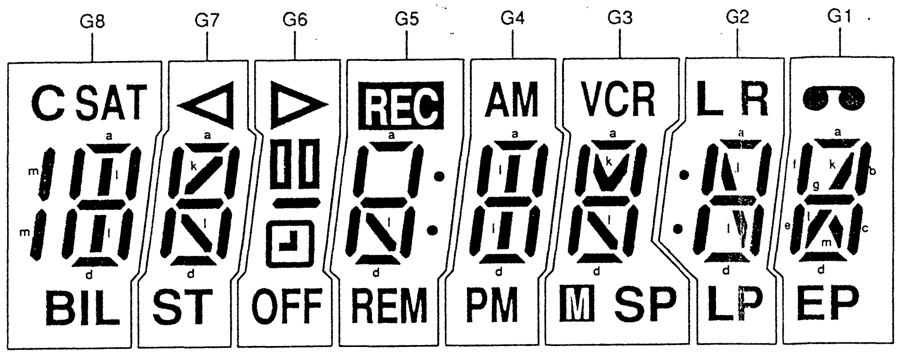

TM-1
T1-14200/TP4-E
A7101
F- 1
F- 2
8G 4
7G 5
6G 6
5G 7
4G 8
3G 9
2G 10
1G 11
NC 12
NC 13
NC 14
NC 15
NC 16
NC 17
L 18
K 19
J 20
I 21
H 22
G 23
F 24
E 25
D 26
C 27
B 28
A 29
F+ 31
F+ 32
CN711
1 BACKUP GND
2 HEATER -
3 GRID 8
4 GRID 7
5 GRID 6
6 GRID 5
7 GRID 4
8 GRID 3
9 GRID 2
10 GRID 1
11 SEG l
12 SEG k
13 SEG j
TO CP-1(SY-A) CN301
CN712
1 SEG i
2 SEG h
3 SEG g
4 SEG f
5 SEG e
6 SEG d
7 SEG c
8 SEG b
9 SEG a
10 HEATER +
11 ALWAYS 5V
12 REMOCON
13 GND
TO CP-1(SY-A) CN302
RR711
IR-RECEIVER
SIG 1
VDD 2
VSS 3

A7101: 1AC4T40A02300 or
1AC4T40A02301

RR711: 1AC4U20A01300 or
1AC4U20A01700

A7101 DISPLAY (FLD) GRID/ANODE ASSIGNMENT DRAWING & TABLE

GRID & SEGMENT ASSIGNMENT

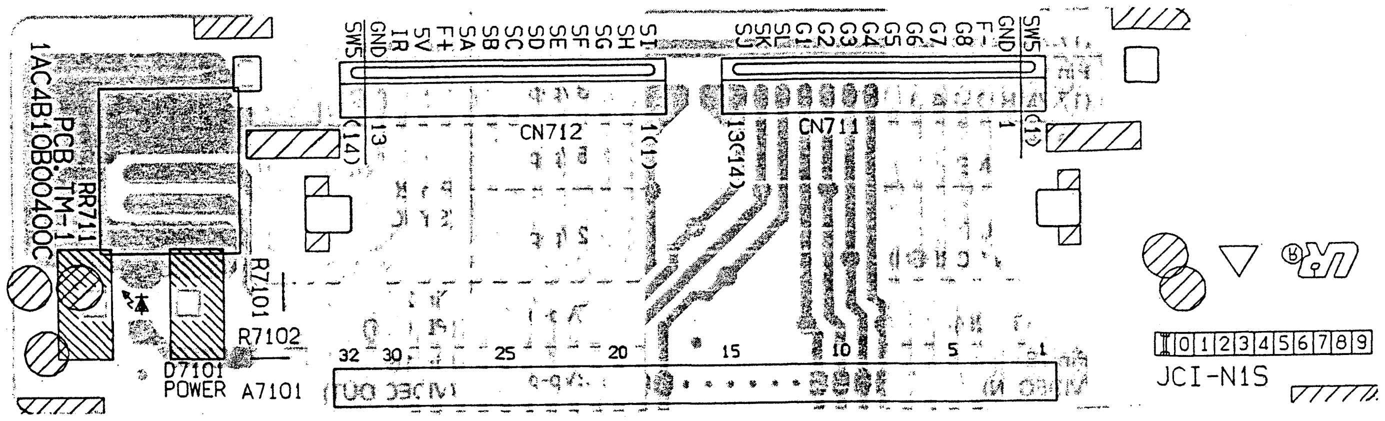

G8
G7
G6
G5
G4
G3
G2
G1
C SAT
REC
AM
VCR
L R
BIL
ST
OFF
REM
PM
M SP
LP
EP

ANODE CONNECTION

GRID / SEGMENT	G8	G7	G6	G5	G4	G3	G2	G1
a	C	◁	▷	REC	AM	VCR	L	●●
b	SAT	k	▯▯	—	—	k	R	k
c	a	a	━	a	a	a	a	a
d	b	b	▣	b	b	b	b	b
e	c	c	—	c	c	c	c	c
f	d	d	—	d	d	d	d	d
g	e	e	—	e	e	e	e	e
h	f	f	—	f	f	f	f	f
i	g	g	—	g	g	g	g	g
j	l	l	—	l	l	l	l	l
k	m	—	—	:	—	M	:	m
l	BIL	ST	OFF	REM	PM	SP	LP	EP

GR-02300

TM-1 P.W.B.

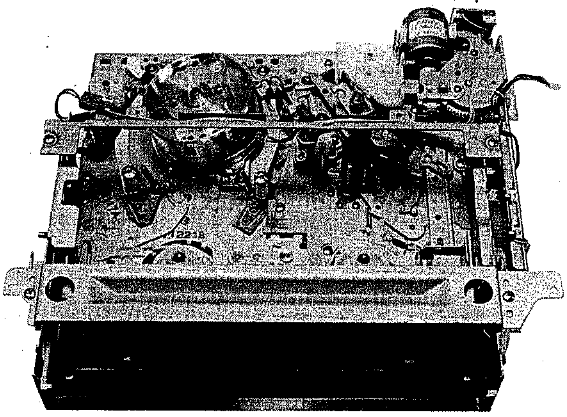

SW5
GND
IR
5V
F+
SA
SB
SC
SD
SE
SF
SG
SH
SI
SJ
SK
SL
G1
G2
G3
G4
G5
G6
G7
G8
F-
GND
SW5
CN712
CN711
RR711
PCB TM-1
1AC4B10B0400C
R7101
R7102
D7101
POWER
A7101
32
30
25
20
15
10
5
1
0 1 2 3 4 5 6 7 8 9
JCI-N1S

V07979

Mechanism Service Technical Information

Colour Video Cassette Recorder

P90 MECHANISM



PAL SECAM

Contents

1.OUTLINE OF MECHANISM 1
- 1-1.FULL LOADING MECHANISM 1

2.DESCRIPTION OF MECHANISM OPERATION 3
- 2-1.BASIC OPERATION MODE OF MECHANISM 3
- 2-2.DESCRIPTION OF MECHANISM DRIVE 4
- 2-2-1.Tape Loading Mechanism 8
- 2-2-2.Pinch Roller Pressing Mechanism 9
- 2-2-3.Operation of Brake Control Plate 10
- 2-2-4.Brake Control Mechanism 11
- 2-2-5.Brake Lock Release Mechanism (FF/REW→STOP Mode) 12
- 2-3.REEL TABLE DRIVE 14
- 2-3-1.Tape Reel Table Drive Machanism 14
- 2-3-2.Reel Table Drive Clutch Lock and Release Mechanism 16
- 2-4.FRONT LOADING DRIVE SELECTION MECHANISM 18
- 2-5.CASSETTE HOLDER MECHANISM 22
- 2-5-1.Components 22
- 2-5-2.Description of Cassette Holder 23

3.MECHANISM CONTROL 24
- 3-1.MODE ARRANGEMENT 24
- 3-2.MODE DETECTION SWITCH 24
- 3-3.CONSIDERATION TO FULL LOADING 25

4.MECHANISM MAINTENANCE AND CHECKING 26
- 4-1.PERIODIC CHECKING, MAINTENANCE ITEM AND SERVICE JIGS 26
- 4-1-1.Periodic Check Items 26
- 4-1-2.Cleaning 27
- 4-1-3.Service Jigs 28
- 4-1.MODE SELECTOR (VHJ-0050)
- 4-2.HANDLING INSTRUCTIONS 29
- 4-2-1.Part Names 29
- 4-2-2.Connection 30
- 4-2-3.Handling 31

5.MECHANISM DISMANTLING AND BEASSEMBLING 32
- 5-1.MECHANISM MAIN UNIT 32
- 5-2.CASSETTE HOLDER MECHANISM 33
- 5-2-1.COMPL Cassette Mechanism 33
- 5-2-2.Gear Bracket Ass'y 34
- 5-2-3.Cassette Drive Gears (Right) 35
- 5-2-4.Cassette Drive Gears (Left) 36
- 5-2-5.FL Start Switch 37
- 5-2-6.T-TOP Sensor & T-END Sensor 38
- 5-3.COMPL HOLDER MOTOR (LOADING MOTOR BLOCK) 39
- 5-3-1.COMPL. Motor Bracket 39
- 5-3-2.Loading Motor 40
- 5-4.TAPE LOADING MECHANISM 42
- 5-4-1.Main Parts of the Loading Mechanism 42
- 5-4-2.Mode Cam 44
- 5-5.COMPL HEAD BRACKET (ACE HEAD) 45
- 5-6.PINCH ROLLER PRESSURE MECHANISM 46
- 5-7.BRAKE MECHANISM 48
- 5-7-1.Sub Take-up Brake Ass'y 48
- 5-7-2.Supply Brake Ass'y and Take-up Brake Ass'y 49
- 5-7-3.Tension Lever Ass'y and Band Holder Ass'y 50
- 5-7-4.Capstan Brake Ass'y 51
- 5-8.REEL TABLE DRIVE MECHANISM 52
- 5-8-1.Supply Reel Ass'y and Supply Reel Gear 52
- 5-8-2.Take-up Reel Ass'y 53
- 5-8-3.Take-up Reel Gear 52
- 5-8-4.Reel Pulley and Friction Gear Ass'y 55
- 5-8-5.COMPL Clutch 56
- 5-8-6.Clutch Change Lever and Clutch Lever Ass'y 57
- 5-9.CAPSTAN MOTOR 58
- 5-10.FIXED GUIDE, FE HEAD LEVER ASS'Y 59
- 5-10-1.Entrance Side Fixed Guide and FE Lever Ass'y 59
- 5-10-2.Impedance Roller, FTE Head 60
- 5-10-3.Exit Side Fixed Guide 61
- 5-11.DRUM SECTION 62
- 5-11-1.Drum Motor (rotor, stator) 62
- 5-11-2.Drum Unit 63
- 5-11-3.Upper Drum (Upper Cylinder) 64
- 5-12.HOW TO PROCEED WHEN THE CASSETTE CANNOT BE REMOVED 67

6.MECHANISM ADJUSTMENT 68
- 6-1.OPERATING THE MECHANISM WITH NO CASSETTE INSERTED 68
- 6-2.REEL TABLE HEIGHT ADJUSTMENT AND TORQUE CHECK 69
- 6-2-1.Reel Table Height 69
- 6-2-2.Torque Check 70
- 6-3.TENSION POLE (BACK TENSION GUIDE) POSITION ADJUSTMENT AND BACK TENSION TORQUE CHECK 71
- 6-3-1.Tension Pole Position Adjustment 71
- 6-3-2.Back Tension Torque Check 71
- 6-4.TAPE PATH ADJUSTMENT 72
- 6-4-1.Preparations for Adjustment 72
- 6-4-2.Adjustment by Visual Observation after Guide Roller, Fixed Guide or COMPL Head Bracket Replacement 73
- 6-4-3.Entrance Side Fixed Guide (S) Height Adjustment 74
- 6-4-4.Guide Roller Adjustment 75
- 6-4-5.Exit Side Fixed Guide (T) Adjustment 76
- 6-4-6.COMPL Head Bracket (ACE Head) Adjustment 76
- 6-4-7.Checking after Adjustment 78

1. OUTLINE OF MECHANISM

This mechanism is named P-90 Mechanism. Its features include :

(1) The chassis is fabricated by drawing a 1.6mm thick electric zinc plated steel sheet, and mechanical parts are ingeniously laid on this chassis. The mechanism is as thick as 70.3 mm.

(2) After insertion of a cassette, the tape is normally wound to the head drum based on the full loading system. This design results in the shortening of the mode shift time, that is, the time from the depression of the PLAY pushbutton switch to the video image display on screen has been significantly quickened.

(3) The full loading system employed has the F/R search capability (when the same button (F.FWD or REW) is pressed in the F.FWD or REW modes, the search mode playback image appears on the screen).

(4) Also, a thin type head drum without lead is provided to increase the operating convenience of the equipment to a considerable extent.

(5) The drive source for cassette loading and the motor for the tape loading mode selection are used in combination with the head motor and the capstan motor for realization of a 3-motor system.

1-1. FULL LOADING MECHANISM

(1) Description of full loading mechanism
As shown in Fig. 1-1 a tape has hitherto been wound onto the head drum only in the PLAY and F/R SEARCH mode, but in this radically new mechanism, in every mode can be made with the tape kept wound onto the head drum.

(2) Features of full loading mechanism
With the provision of the full loading mechanism, the operating convenience, which was hitherto a drawback of the VHS system, has been improved. A host of other salient features are also designed into this mechanism as apparent from the following description.

I. Quick playback
Mode shift time such as the STOP→PLAY and FF/REW→PLAY has been shortened for quicker playback.

II. High-speed VISS
The time from the detection of VISS search signal based on the VHS standardized search system till image display on the screen has considerably been shortened to make high-speed VISS possible.

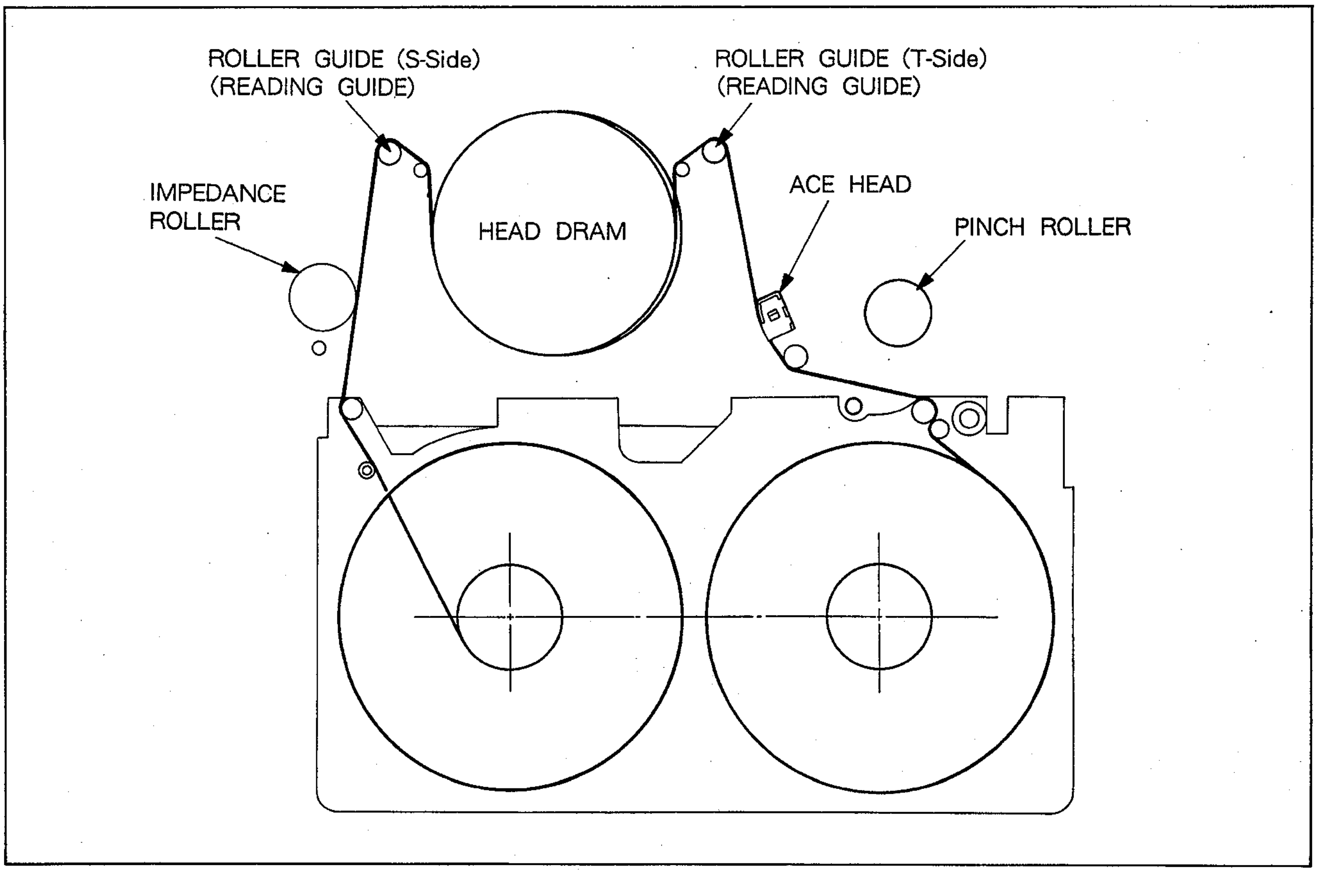


Fig. 1-1 FULL LOADING SYSTEM (AT FF/REW MODE)

III. F/R search
FF↔F-SEARCH and REW↔R-SEARCH can be made direct by reducing the mode transition time.

(3) Protection mechanism for full loading system

I. Video Tape Protection Mechanism
(a) FF/REW→STOP
Tape tension applied to the head drum when stopping is lowered by optimizing the balance between the left and right, and brake forces acting on the left and right reel table. Thereby it prevents from causing a scratch on the tape due to V-head when stopping.
(b) STOP→FF/REW
The starting-up speed of the capstan motor is ingeniously designed to preclude the possibility of unusual tape tension at the time of REW/FWD start-up.
(c) Tape end brake damping
The design of the mechanism is so made that the time from issuance of an electrical STOP command till actual brake application is reduced to a minimum. This enable the braking to be completed before the reader tape end.
(d) FF/REW running
To ensure highly stable tape running in any condition and any environment, design consideration is given to the foundation brake torque (soft brake) to the reel table and the tape winding angle with respect to each tape guide. Particularly in regard to the supply side fixing guide and F.T.E (Full Track Erase) head, the design is so made that they do not come into contact with the tape at the time of FF/REW operation to alleviate load application.

II. Final End Position Tape Loading Protection Mechanism
Tape pull-out (loading) from within the cassette is done to ensure proper take-up of the tape onto the head drum. At that time, the tape is extended from the supply reel side.
So, if the tape is wound to the final end, no loading can be made. For this reason, a mode is designed to allow the tape to be rewound a little at the final end of the tape without any loading done.

2. DESCRIPTION OF MECHANISM OPERATION

2-1. BASIC OPERATION MODE OF MECHANISM

The P-90 mechanism has its original modes such as given in Table 2-1, in addition to the VTR is operation modes (STOP, FF, REW, PLAY, REC, R-SEARCH, F-SEARCH, STILL, SLOW, and ETS). These modes specific to the mechanism play important roles in tape protection operation at the time of a shift to various modes of the VTR above. A shift to the mode specific to the mechanism is carried out by controlling the rotation of the loading motor with the control signal of the system control circuit. The detection of important mechanism operation mode positions is done by using the FL START SWITCH for detecting the cassette ejection/insertion, and the MECHANISM MODE SWITCH for detecting each mode of the mechanism (3 bit MODE DATA is output by operating the rotary switch).

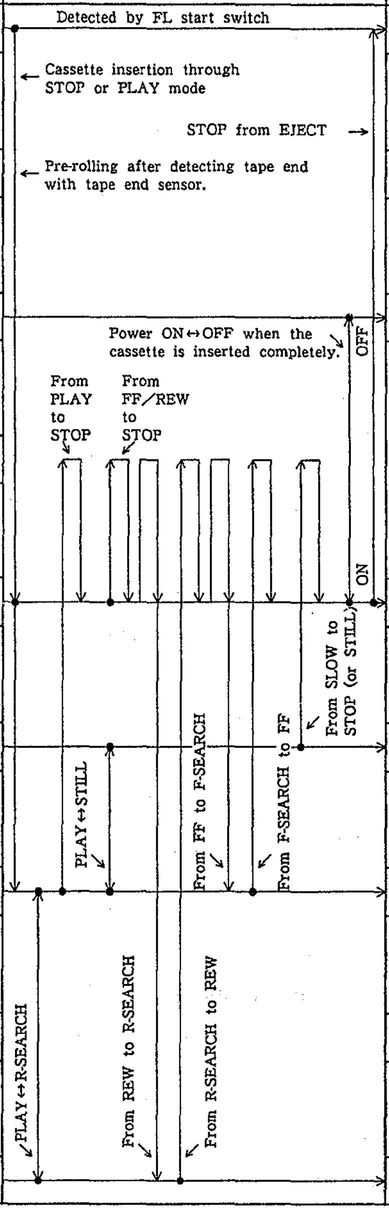
Mechanism Mode	Mechanism Mode Switch 3	2	1	HEX DATA	Function	Main Mode Shifting Conditions	VTR Operation Mode
EJECT	–	–	–		Eject position	 Detected by FL start switch Cassette insertion through STOP or PLAY mode STOP from EJECT Pre-rolling after detecting tape end with tape end sensor. Power ON↔OFF when the cassette is inserted completely. OFF ON From PLAY to STOP From FF/REW to STOP From SLOW to STOP (or STILL) From FF to F-SEARCH From F-SEARCH to FF PLAY↔STILL PLAY↔R-SEARCH From REW to R-SEARCH From R-SEARCH to REW	EJECT
					Front loading/Unloading		
SHORT REW	–	–	–		Take up operation in the tape end position		Low side of ⑥. Sensed upon IN
INITIAL	1	1	1	⑦	Power off position		Power off when tape is loaded completely
					Tape unloading position Tape loading Tape loading ending position		
BRAKE	0	0	1	①	Main brake applying position		
STOP / FF/REW	0	1	0	②	STOP waiting and FF/REW (the head motor rotation)		STOP, FF/REW
STILL	0	1	1	③	The positions of STILL, SLOW or F-ADV.		STILL, SLOW, F-ADV
PLAY	1	0	0	④	From FWD direction Normal running mode		PLAY, REC, F-SEARCH
IDLER	1	0	1	⑤	Forward/reverse changeover position		PAUSE
REV	1	1	0	⑥	From REV direction Normal running mode		R-SEARCH

Table 2-1

2-2. DESCRIPTION OF MECHANISM DRIVE

To realize the thin type mechanism, a loading motor and two pieces of cam (MAIN CAM GEAR and the MODE CAM GEAR) to be driven by the said motor are mounted on the upper part of the capstan motor, that was a dead space in the conventional mechanisms hitherto available with a view to optimization of parts mounting layout. (Fig. 2-1 and Fig. 2-2.)

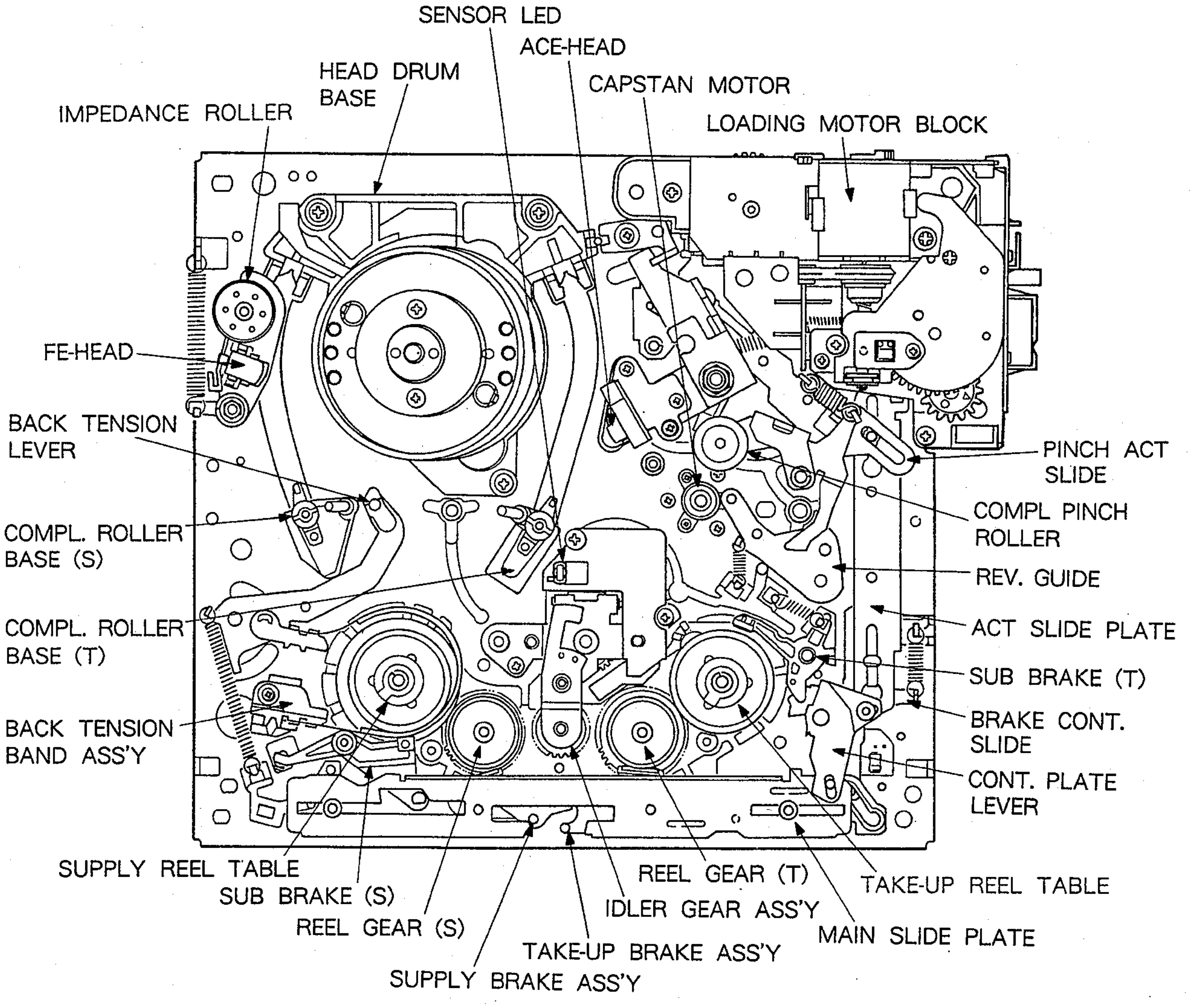

SENSOR LED
ACE-HEAD
HEAD DRUM BASE
CAPSTAN MOTOR
IMPEDANCE ROLLER
LOADING MOTOR BLOCK
FE-HEAD
BACK TENSION LEVER
PINCH ACT SLIDE
COMPL. ROLLER BASE (S)
COMPL PINCH ROLLER
REV. GUIDE
COMPL. ROLLER BASE (T)
ACT SLIDE PLATE
SUB BRAKE (T)
BACK TENSION BAND ASS'Y
BRAKE CONT. SLIDE
CONT. PLATE LEVER
SUPPLY REEL TABLE
SUB BRAKE (S)
REEL GEAR (S)
REEL GEAR (T)
TAKE-UP REEL TABLE
IDLER GEAR ASS'Y
MAIN SLIDE PLATE
TAKE-UP BRAKE ASS'Y
SUPPLY BRAKE ASS'Y
FRONT

Fig. 2-1 TOP VIEW OF MECHANISM (INITIAL MODE)

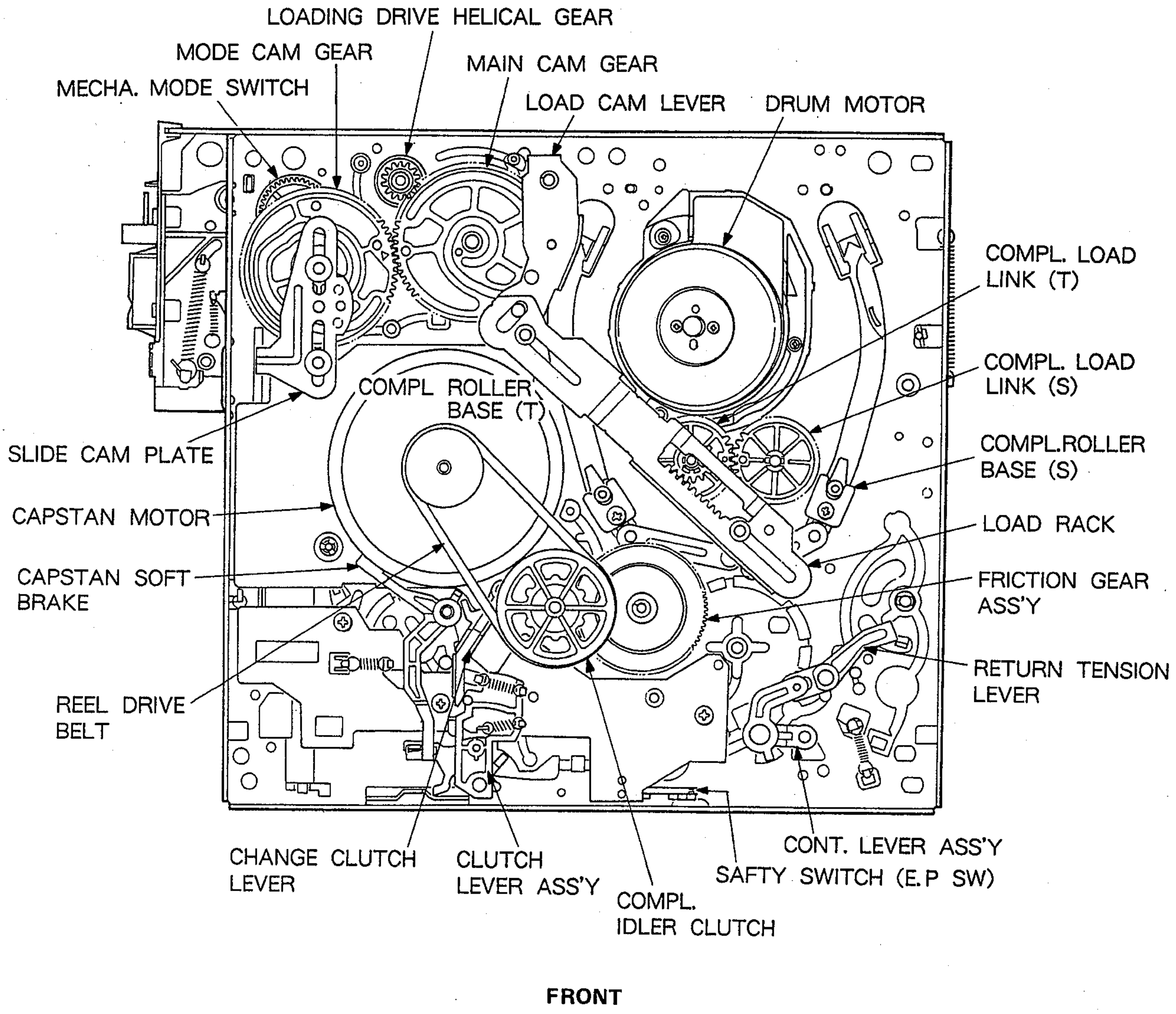

LOADING DRIVE HELICAL GEAR
MODE CAM GEAR
MAIN CAM GEAR
MECHA. MODE SWITCH
LOAD CAM LEVER
DRUM MOTOR
COMPL. LOAD LINK (T)
COMPL. LOAD LINK (S)
COMPL ROLLER BASE (T)
SLIDE CAM PLATE
COMPL.ROLLER BASE (S)
CAPSTAN MOTOR
LOAD RACK
CAPSTAN SOFT BRAKE
FRICTION GEAR ASS'Y
RETURN TENSION LEVER
REEL DRIVE BELT
CHANGE CLUTCH LEVER
CLUTCH LEVER ASS'Y
COMPL. IDLER CLUTCH
CONT. LEVER ASS'Y
SAFTY SWITCH (E.P SW)
FRONT

Fig. 2-2 BOTTOM VIEW OF MECHANISM (INITIAL MODE)

These two cams have one CAM GROOVE on both sides. A total of four CAM GROOVEs performs independent functions to meet the multi-function needs of these days by driving the elements of a wide variety of functions with the motor precisely controlled by a microcomputer.

The two cams are positive motion cams having a groove over 570 degrees. These cams cause the amount of lift to be changed by a mild gradient according to the angle of rotation while synchronizedly being rotated by an outer circumferential gear to alleviate the load exerted on the cams when driving the rod linked with the cams and also to ensure position stability in each mode of operation. The geometry of each cam and that of a metal fitting of the drive section are shown in Fig. 2-3 and Fig. 2-4, respectively. Also, the role of each cam used is described below.

On the GROOVE 3 side of MODE CAM GEAR have a small gear.

This small gear is engaged with the MECHANISM MODE SWITCH as shown in Fig. 2-3., and detect the mechanism operation mode. In this way, the two cams and the MECHANISM MODE SWITCH are rotated synchronously, and the mechanism is fully synchronized and driven for each mode.

MAIN CAM GEAR :	CAM GROOVE 1. Pinch roller pressing operation CAM GROOVE 2. Tape loading mechanical drive
MODE CAM GEAR :	CAM GROOVE 3. Brake and clutch selecting operation CAM GROOVE 4. Brake control and front unloading control

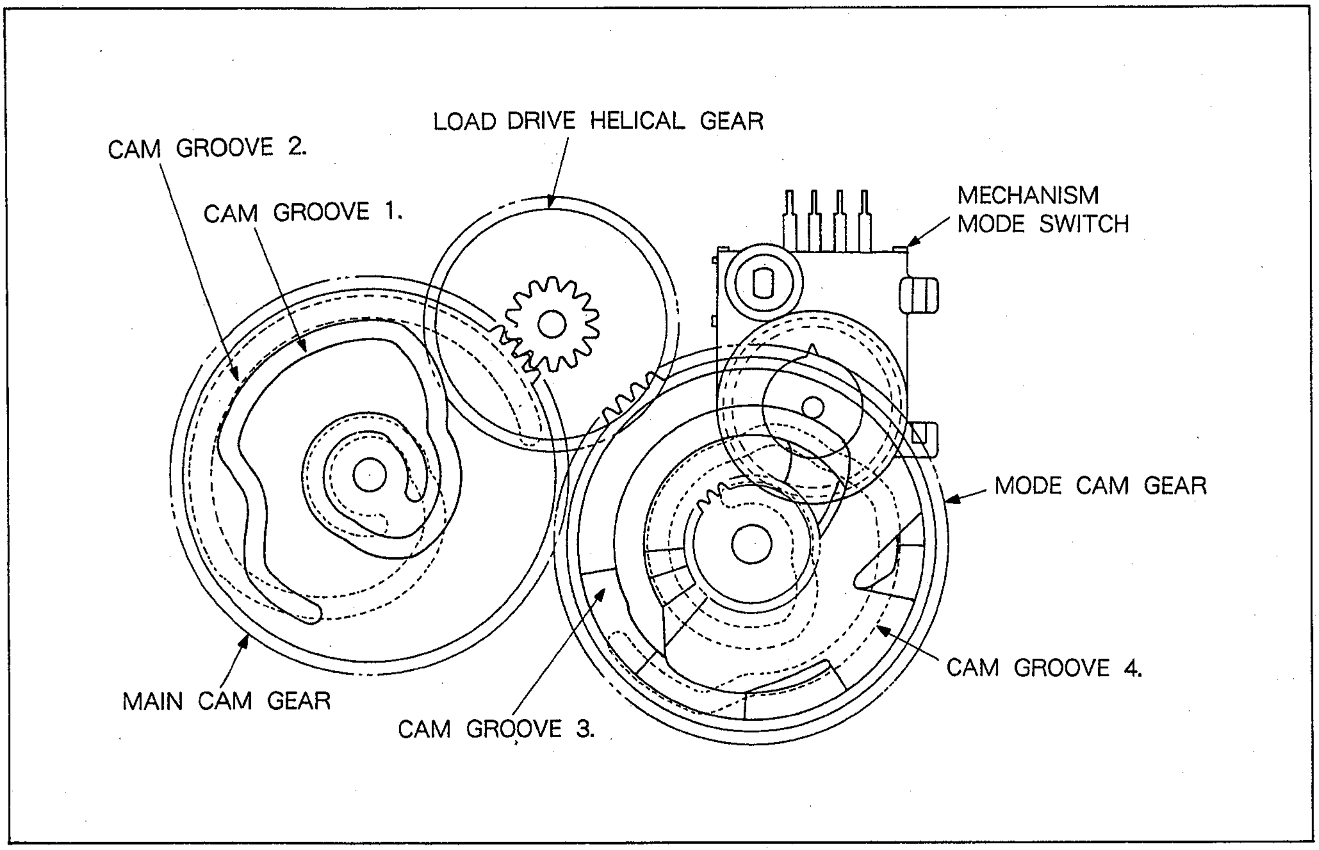


Fig. 2-3 PLAN OF CAMS CONSTRUCTION

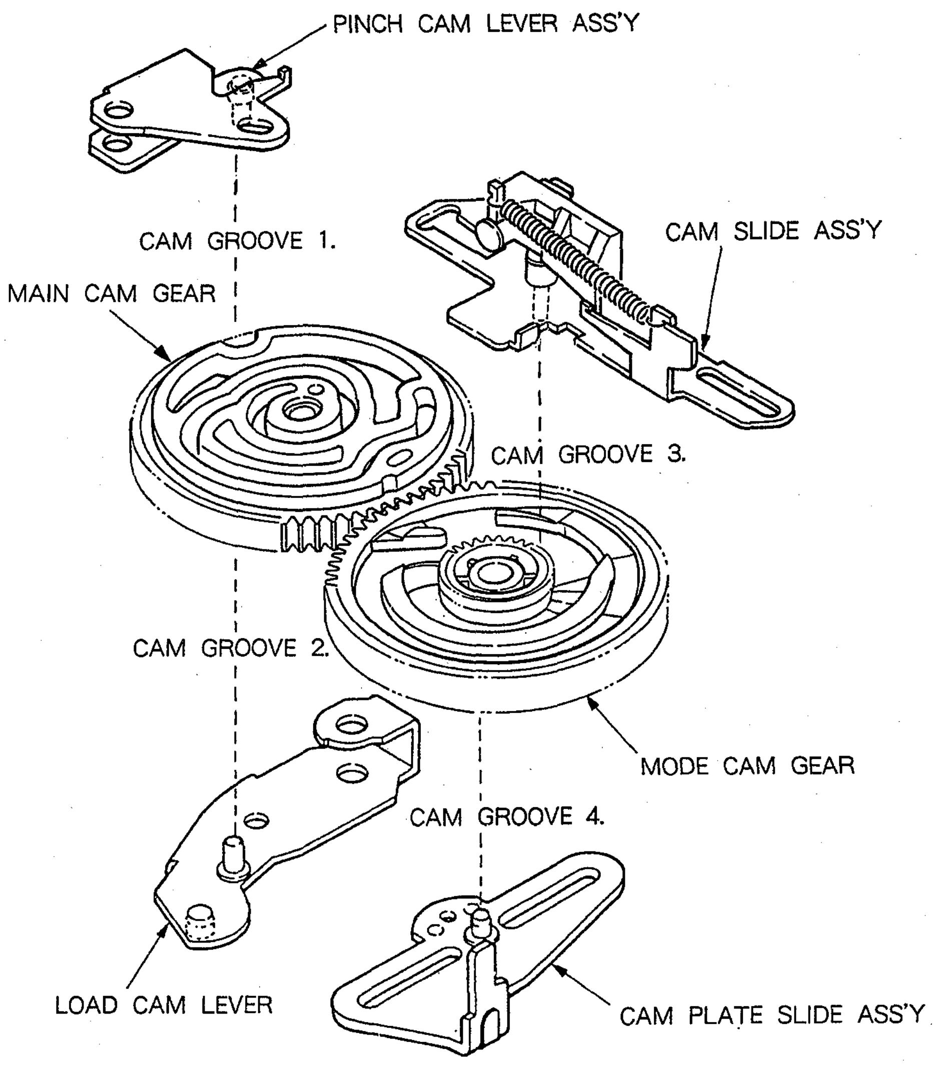

PINCH CAM LEVER ASS'Y
CAM SLIDE ASS'Y
CAM GROOVE 1.
MAIN CAM GEAR
CAM GROOVE 3.
CAM GROOVE 2.
MODE CAM GEAR
CAM GROOVE 4.
LOAD CAM LEVER
CAM PLATE SLIDE ASS'Y

Fig. 2-4 VIEW OF CAMS CONSTRUCTION

2-2-1. Tape Loading Mechanism

The tape loading mechanism is compactly designed with use of a LOAD RACK for loading by drive from the before-mentioned MAIN CAMs with CAM GROOVE 2. The LOAD RACK is laid on the dead space in between the DD capstan motor and the head motor for effective space utilization. (Fig. 2-5) The process from tape pull-out upon loading to contact of the leading guide section with the stopper of drum base and press-fitting under tension of spring is guided and driven in such a manner that the rod is drawn inward from the outer circumferential direction of the CAM GROOVE 2, thereby reducing the load torque (PV value) to the CAM GROOVE. And, the load of the loading motor is minimized to enhance reliability.

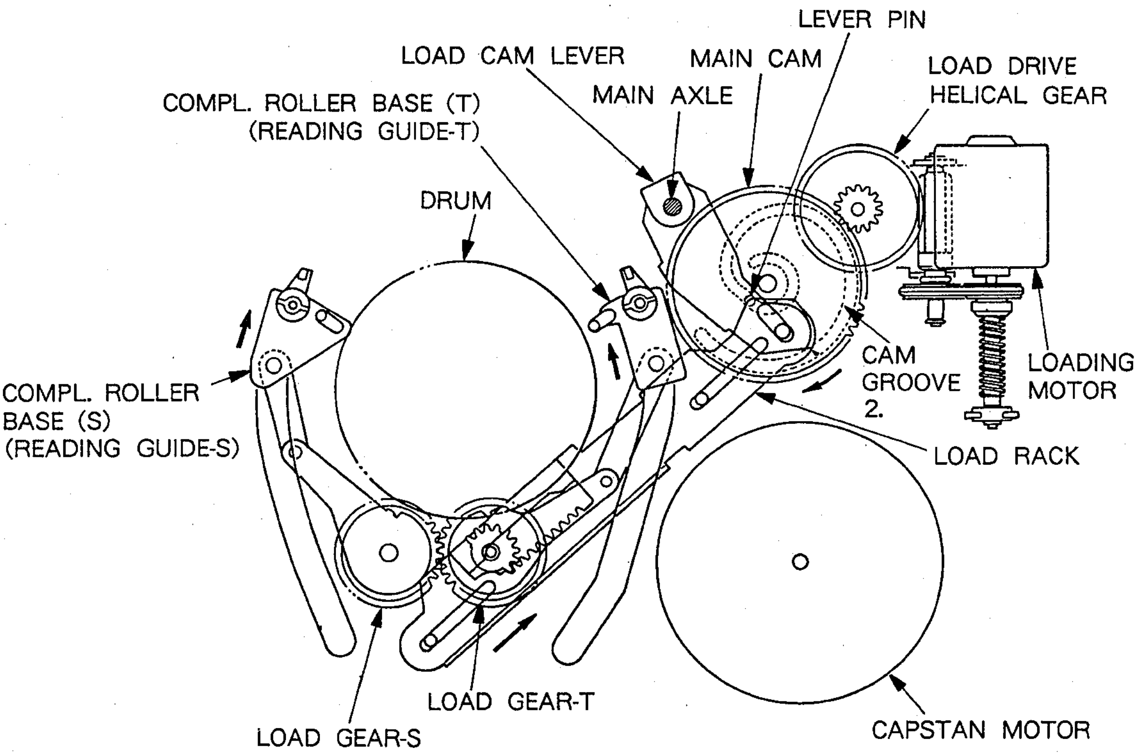

LEVER PIN
LOAD CAM LEVER
MAIN CAM
LOAD DRIVE HELICAL GEAR
COMPL. ROLLER BASE (T) (READING GUIDE-T)
MAIN AXLE
DRUM
COMPL. ROLLER BASE (S) (READING GUIDE-S)
CAM GROOVE 2.
LOADING MOTOR
LOAD RACK
LOAD GEAR-T
LOAD GEAR-S
CAPSTAN MOTOR

Fig. 2-5 CONSTRUCTION OF TAPE LOADING MECHANISM

2-2-2. Pinch Roller Pressing Mechanism

The PINCH LEVER assembly of the pinch roller is operated by the PINCH CAM LEVER (rod) driven by the CAM GROOVE 1 of the before-mentioned MAIN CAM, and then press-fitted to the capstan. The revolving tape guide (REV.GUIDE) is interlockingly operated with the PINCH LEVER assembly to ensure stable tape running at a fixed speed. (Fig. 2-6)

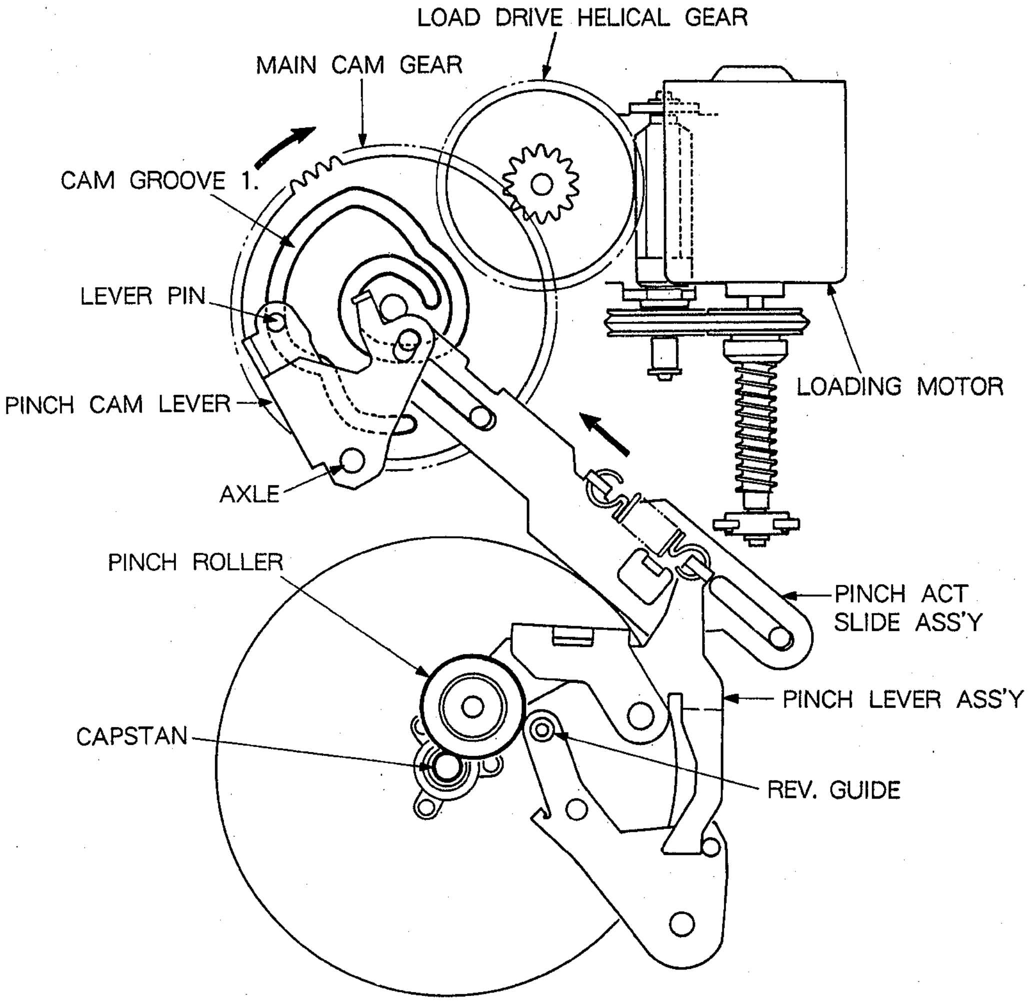

LOAD DRIVE HELICAL GEAR
MAIN CAM GEAR
CAM GROOVE 1.
LEVER PIN
PINCH CAM LEVER
AXLE
PINCH ROLLER
CAPSTAN
LOADING MOTOR
PINCH ACT SLIDE ASS'Y
PINCH LEVER ASS'Y
REV. GUIDE

Fig. 2-6 CONSTRUCTION OF PINCH ROLLER MECHANISM

2-2-3. Operation of Brake Control Plate

The ACT SLIDE PLATE and the MAIN SLIDE PLATE shown in Fig. 2-7 is driven by the CAM GROOVE 4 of the MODE CAM GEAR for precise control of operations including the control of back tension lever, auxiliary brake (SUB BRAKE S/T), main brake (SUPPLY BRAKE and TAKE-UP BRAKE), clutch selection, and drive selection of front loading mechanism.

Also, the mechanism mode switch is engaged with the small gear of the MODE CAM GEAR for sync rotation. At the time, the detection position of each mode is set so that it becomes the flat section at the cam curve of the CAM GROOVE 4 of the MODE CAM GEAR. So, even if motor stop time deviation occurs due to the load following the detection of the loading motor stop position, the control plate linked with a stop in the specified position.

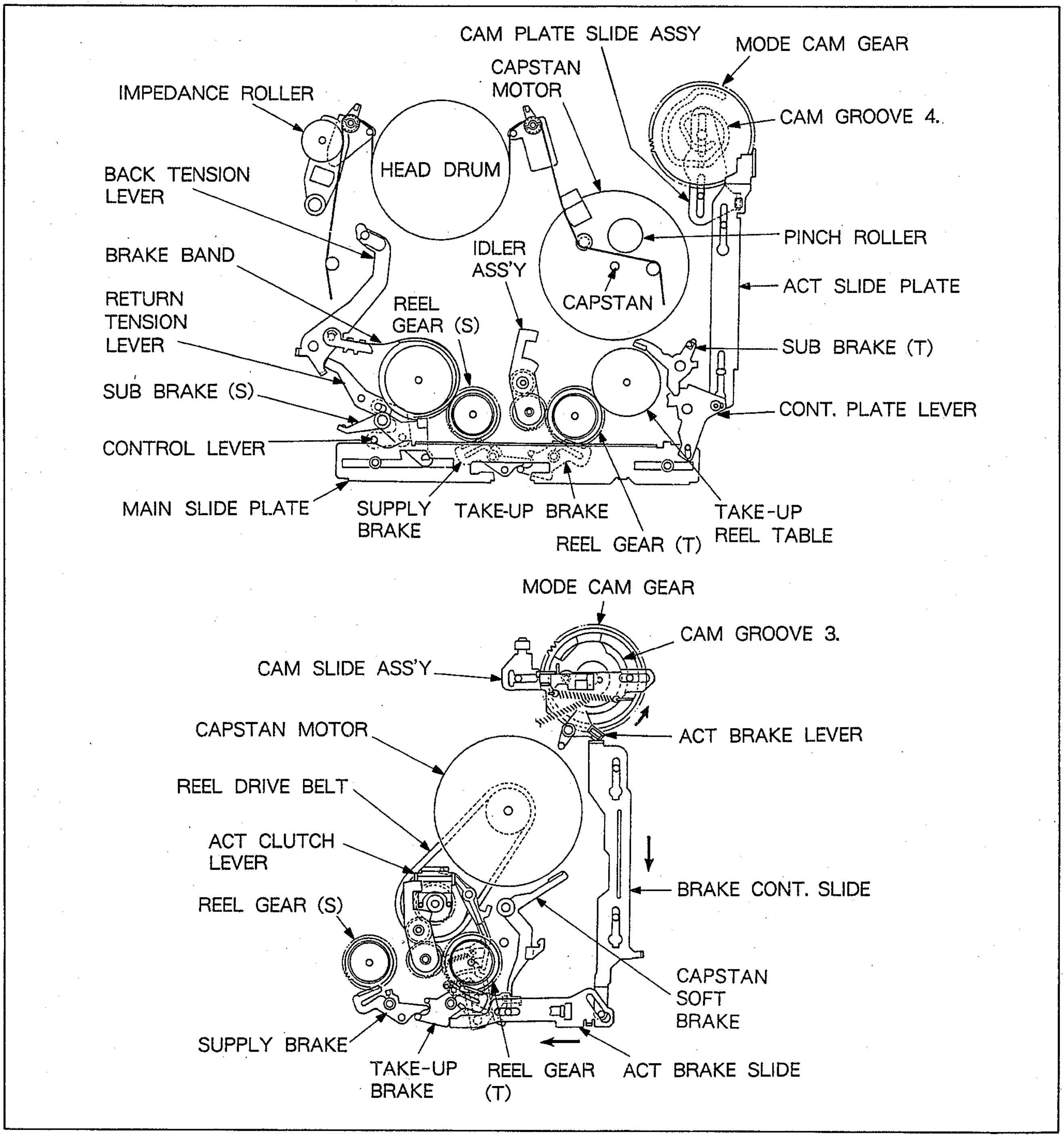

CAM PLATE SLIDE ASSY
MODE CAM GEAR
CAPSTAN MOTOR
IMPEDANCE ROLLER
CAM GROOVE 4.
HEAD DRUM
BACK TENSION LEVER
PINCH ROLLER
BRAKE BAND
IDLER ASS'Y
ACT SLIDE PLATE
RETURN TENSION LEVER
REEL GEAR (S)
CAPSTAN
SUB BRAKE (T)
SUB BRAKE (S)
CONT. PLATE LEVER
CONTROL LEVER
MAIN SLIDE PLATE
SUPPLY BRAKE
TAKE-UP BRAKE
TAKE-UP REEL TABLE
REEL GEAR (T)
MODE CAM GEAR
CAM GROOVE 3.
CAM SLIDE ASS'Y
CAPSTAN MOTOR
ACT BRAKE LEVER
REEL DRIVE BELT
ACT CLUTCH LEVER
BRAKE CONT. SLIDE
REEL GEAR (S)
CAPSTAN SOFT BRAKE
SUPPLY BRAKE
TAKE-UP BRAKE
REEL GEAR (T)
ACT BRAKE SLIDE

Fig. 2-7 CONSTRUCTION OF BRAKE CONTROL PLATE (AT REW/FF, STOP MODE)

2-2-4. Brake Control Mechanism

The mechanical logic of the brake state is shown in Fig. 2-8. The brake which damps the reel rotation is operated by the BRAKE CONTROL SLIDE driven from the CAM GROOVE 3 of the MODE CAM GEAR.

Also, to alleviate damage to the tape caused by high tension of the brake in operation, the tape is stopped after brake operation and the shape is thoughtfully designed for proper biting-in ratio of the left and the right brakes after-mentioned to each other.

This enables the supply brake to be released by the operation of the above-mentioned MAIN SLIDE PLATE after an elapse of prefixed slight time to reduce the tape tension to zero, and to provide the tape with a proper degree of looseness. As a result, a slight gap is created in the tape from the HEAD DRUM.

Further, a momentary still mechanism which dispenses with use of a plunger solenoid is not provided as one of design features of the P-90 mechanism.

To stabilize the image in an extremely short period of time during a shift to the STILL mode from the PLAY mode, the auxiliary brake (CAPSTAN SOFT BRAKE) is press-fit to the outer circumference of the capstan motor by the before-mentioned CAM GROOVE 3 of the MODE CAM GEAR.

These operations is interlocked with the operation of the before-mentioned ACT SLIDE PLATE and the MAIN SLIDE PLATE. It consists of one MODE CAM for offsetting the operating position.

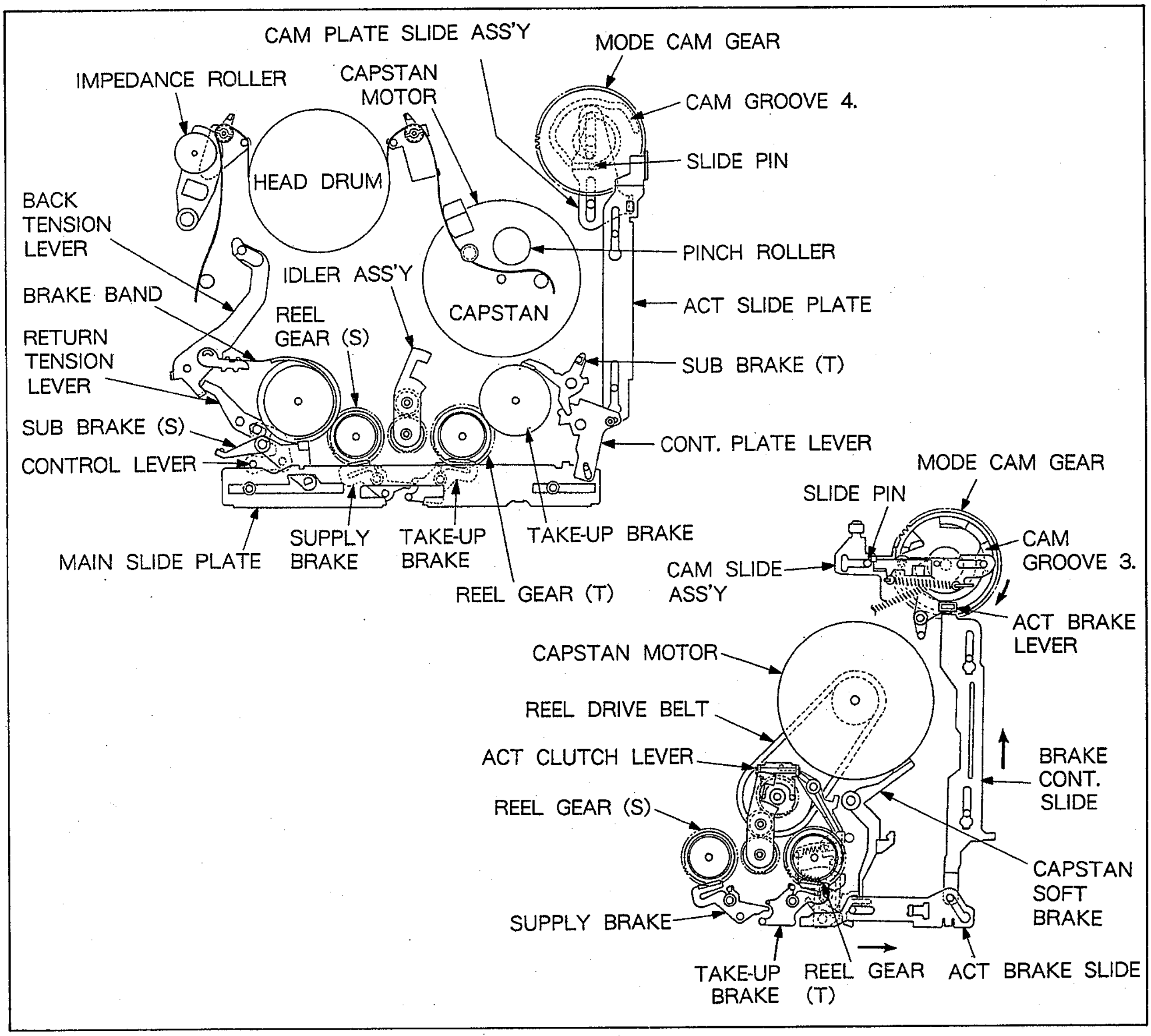
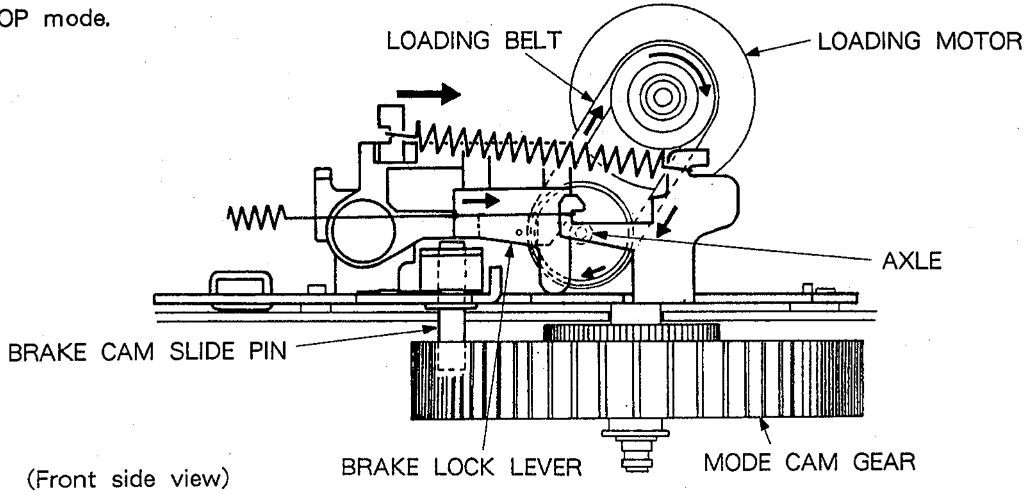

CAM PLATE SLIDE ASS'Y
MODE CAM GEAR
IMPEDANCE ROLLER
CAPSTAN MOTOR
CAM GROOVE 4.
SLIDE PIN
HEAD DRUM
BACK TENSION LEVER
PINCH ROLLER
IDLER ASS'Y
BRAKE BAND
REEL GEAR (S)
CAPSTAN
ACT SLIDE PLATE
RETURN TENSION LEVER
SUB BRAKE (T)
SUB BRAKE (S)
CONT. PLATE LEVER
CONTROL LEVER
MODE CAM GEAR
SLIDE PIN
MAIN SLIDE PLATE
SUPPLY BRAKE
TAKE-UP BRAKE
TAKE-UP BRAKE
CAM GROOVE 3.
CAM SLIDE ASS'Y
REEL GEAR (T)
ACT BRAKE LEVER
CAPSTAN MOTOR
REEL DRIVE BELT
ACT CLUTCH LEVER
BRAKE CONT. SLIDE
REEL GEAR (S)
CAPSTAN SOFT BRAKE
SUPPLY BRAKE
TAKE-UP BRAKE
REEL GEAR (T)
ACT BRAKE SLIDE

Fig. 2-8 CONSTRUCTION OF BRAKE CONTROL PLATE (AT BRAKE MODE)

2-2-5. Brake Lock Release Mechanism (FF/REW→STOP Mode)

The brake lock momentary release mechanism is shown in Fig. 2-9 ⓐ, ⓑ and Fig. 2-10.
In the FF/REW mode (Fig. 2-9 ⓐ) mechanical elastic load is given to the BRAKE LOCK LEVER mounted on the BRAKE CAM SLIDE which causes the brake to operate, and it is locked to the high-speed rotary axle of the 1st reducing section of the loading motor.

ⓐ changes from brake mode or lock released state to FF/REW, STOP mode.

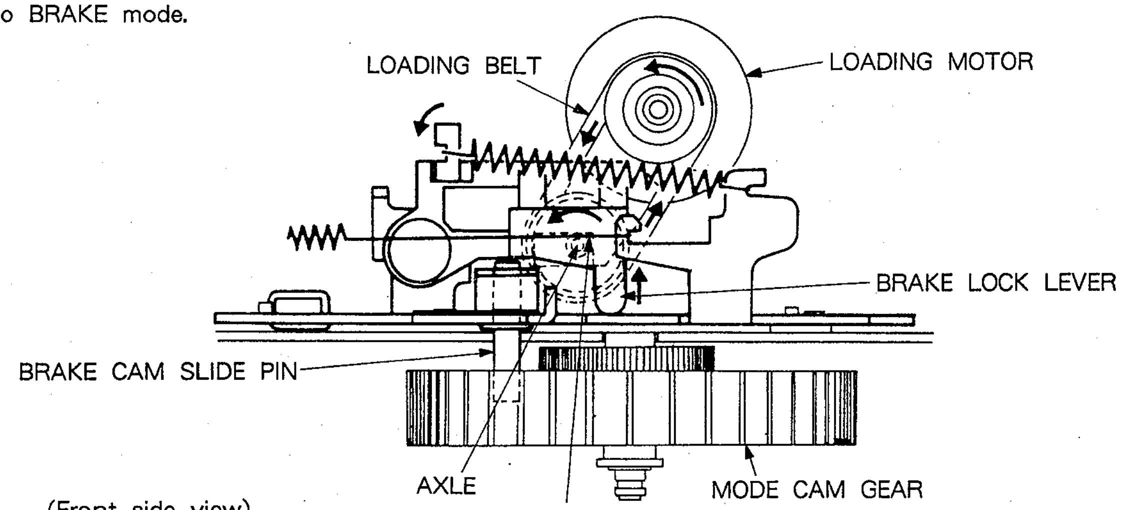

LOADING BELT
LOADING MOTOR
AXLE
BRAKE CAM SLIDE PIN
BRAKE LOCK LEVER
MODE CAM GEAR

(Front side view)

Fig. 2-9 ⓐ BRAKE LOCK & RELEASE MECHANISM

At the time of a shift to the STOP mode from the FF/REW (Fig. 2-9 ⓑ), the BRAKE LOCK LEVER releases the lock on slight rotation of the axle by contact between the rotary shaft and the friction resistance so that the brake can be instantaneously applied to the reel. The lock release speed is almost the same as the start-up of the loading motor. So, the its response to the brake is very quick, and construction is simplified also.

ⓑ Changes from FF/REW, STOP mode to BRAKE mode.


LOADING BELT
LOADING MOTOR
BRAKE LOCK LEVER
BRAKE CAM SLIDE PIN
AXLE
MODE CAM GEAR

(Front side view)

Lock is released by the frictional resistance of an elastic load.

Fig. 2-9 ⓑ BRAKE LOCK & RELEASE MECHANISM

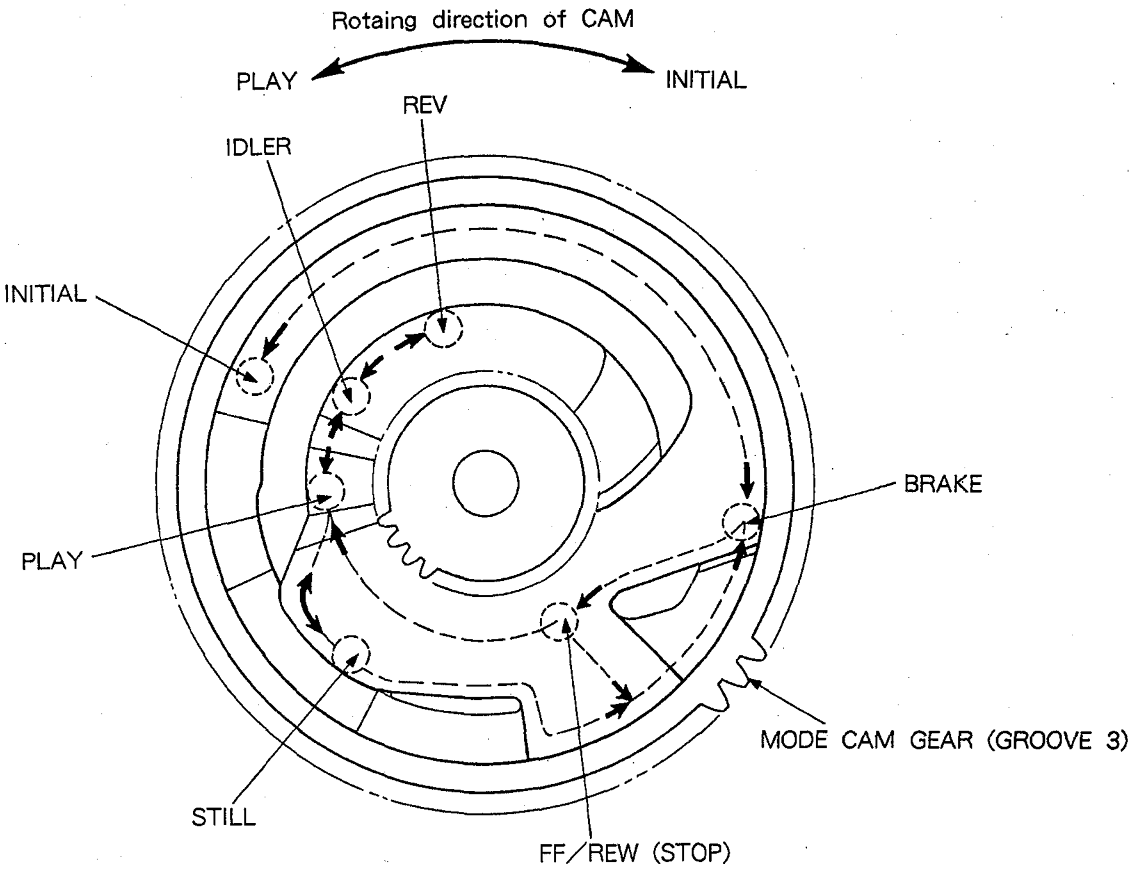

Rotaing direction of CAM
PLAY
INITIAL
REV
IDLER
INITIAL
BRAKE
PLAY
MODE CAM GEAR (GROOVE 3)
STILL
FF/REW (STOP)

Fig. 2-10 POSITIONING OF BRAKE CAM SLIDE-PIN ON THE GROOVE 3 OF MODE CAM GEAR

2-3. REEL TABLE DRIVE

2-3-1. Reel Table Drive Mechanism

This mechanism employs the system of driving the tape from the DD capstan motor via rubber belt. In the tape constant speed running mode for PLAY, F-SEARCH, and R-SEARCH, the capstan and the pinch roller are press-fitted to allow the tape to run at a constant speed. By providing a FRICTION MECHANISM in between the capstan motor and the reel table, the tape is taken up. In the FF/REW tape high-speed take-up mode, the capstan and the pinch roller are separated from each other, and the capstan motor and the reel table are linked direct by the clutch mechanism to carry out tape take-up. Also, to realize a thin type reel table drive section, the mechanism is simplified and the rotary parts are thinned for realization of physically compact design, and a step is provided on the reel table mounting section of the chassis by high-precision drawing process. A simplified figure of the drive mechanism is shown in Fig. 2-11 and Fig. 2-12. Power transmission to the pulley of the clutch mechanism section is done from the DD capstan motor via rubber belt.

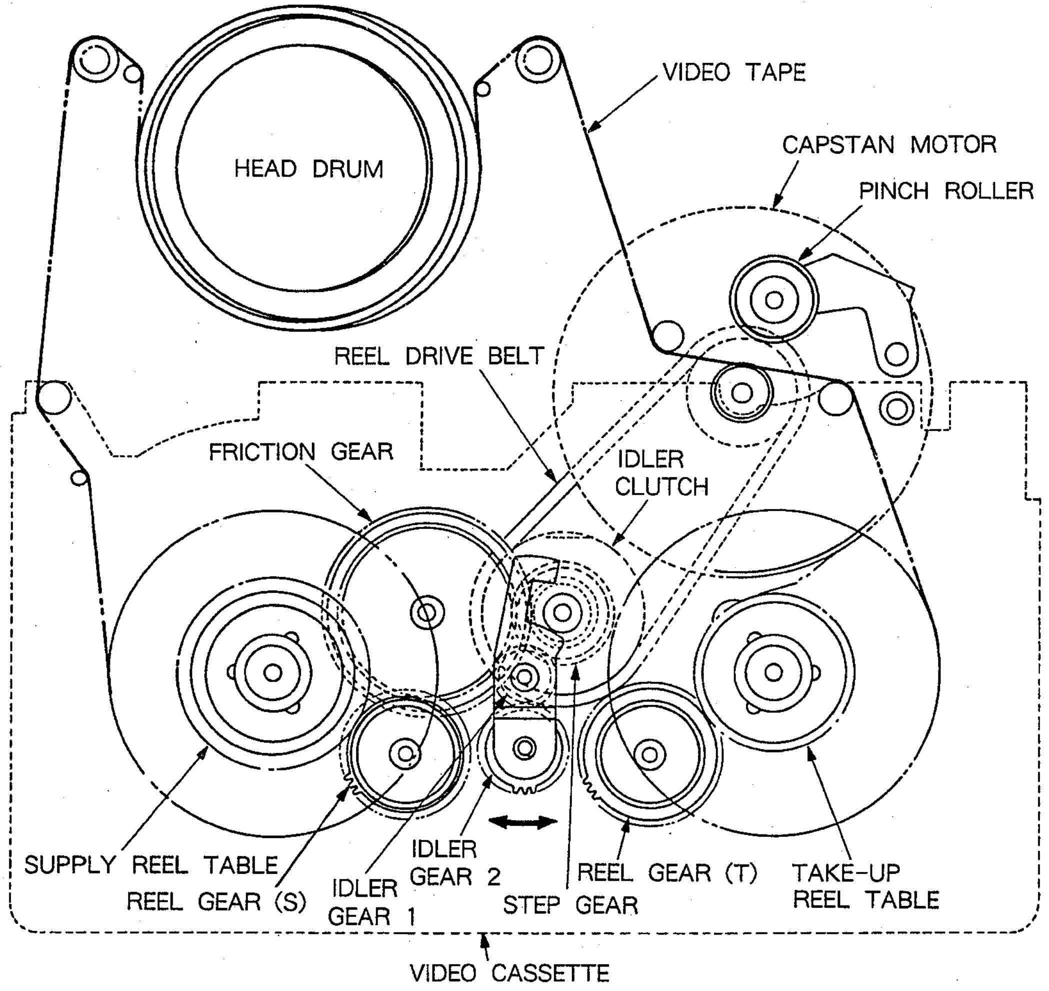

VIDEO TAPE
CAPSTAN MOTOR
PINCH ROLLER
HEAD DRUM
REEL DRIVE BELT
FRICTION GEAR
IDLER CLUTCH
SUPPLY REEL TABLE
REEL GEAR (S)
IDLER GEAR 1
IDLER GEAR 2
STEP GEAR
REEL GEAR (T)
TAKE-UP REEL TABLE
VIDEO CASSETTE

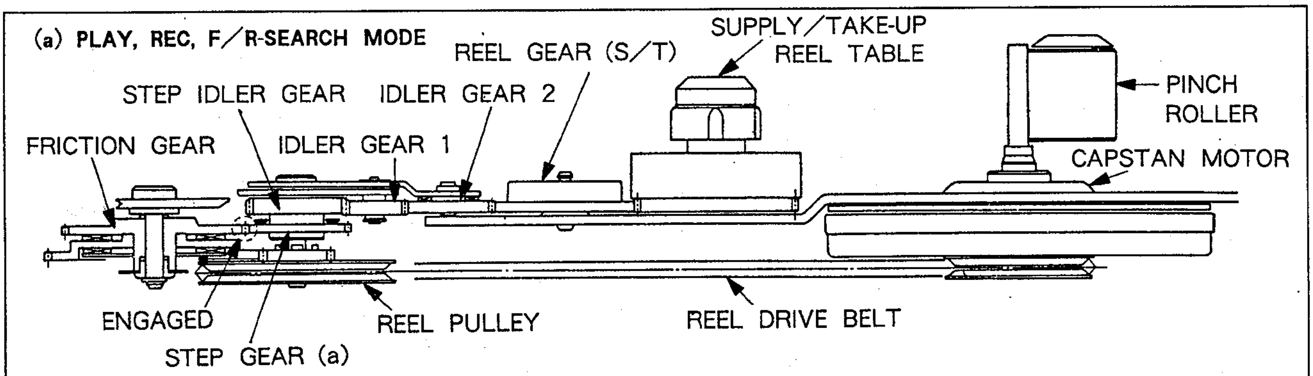
Fig. 2-11 REEL TABLE DRIVE

At that time, the reel table winding speed and the torque needed in a wide variety of modes are obtained by shifting the up and down STEP GEAR positioned at the upper section of pulley. The selection of the STEP GEAR is precision controlled by the MODE CAM GEAR via the BRAKE CONTROL SLIDE. With the up and down STEP GEAR down, the clutch mechanism is direct linked, and the transmission power from the capstan motor is sent to the reel table via IDLER GEAR assembly and REEL GEAR (S/T). On the other hand, FRICTION MECHANISM acts between the pulley and the STEP GEAR when the up and down STEP GEAR are in the elevated state, thereby controlling the transmission torque for generation of the take-up slip. Normally, it is desirable that the take-up torque of the reel table is higher in the R-SEARCH mode than that in the PLAY mode. This is because in the forward tape running the tape winding load to the HEAD DRUM has to be taken care of the capstan and the pinch roller.
While, in the reverse tape running mode the winding load has to be taken on the take-up reel table. In the special playback operation, a mechanism for varying the take-up torque of the reel table is required to be changed depending upon the running direction of the tape. But in this mechanism, the torque selection is made by varying the reduction speed ratio up to the reel table from the capstan motor on both the forward side and the reverse side of the tape. Also, design simplification of the selection mechanism is realized by using a single friction mechanism. In other words, the take-up torque necessary for forward/reverse rotation is obtained by controlling the capstan motor speed.

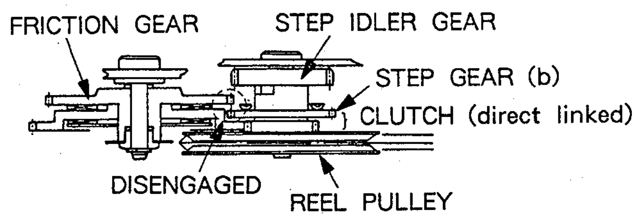
Rotation speed and torque needed for each mode of operation are converted by clutch mechanism for transmission of the drive power to the idler mechanism. The left and right moving IDLER GEAR assembly is automatically rotated to the left and the right according to the direction of capstan motor rotation by using the friction force. Because the mechanism is so designed as to drive the reel table of the side on which the tape is transported by the capstan and pinch roller, the forward and reverse constant speed drive (the PLAY, REC, F/R SEARCH modes) is carried out in the state in which the FRICTION MECHANISM is being operated (Fig. 2-12 ⓐ) On the other hand, in the condition in which the friction mechanism is not in operation, the forward/reverse high speed drive (FF/REW mode) is made possible (Fig. 2-12 ⓑ). Also, the reel drive in all modes is taken care of by the single left and right moving idler for design simplification.

The idler body employs gear drive to improve reliability with a view to realizing parts thinning while securing the transmission reliability. Using a resin molded gear as material of an idler, the efficiency of the entire reel drive system has been improved because there are no deformation and loss, and minimized rotation moving torque necessary for biting-in as in the case of a material such as rubber which shows considerable elastic deformation, etc. Further in this mechanism, an intermediate gear is provided in between the reel side and the idler to minimize the rotating and moving angle of the left and right moving idlers, thereby holding the reversing time to a minimum when shifting to the tape running direction change mode. This results in significantly reduced possibility of tape looseness.

(a) PLAY, REC, F/R-SEARCH MODE



(b) F-FWD/REW, STOP MODE



(a) The clutch mechanism is disengaged, and rorational force is transmitted through the friction mechanism. (Constant speed rotating mode)

(b) Direct transmission is obtained by disengaging the friction mechanism with a clutch mechanism. (High-speed rotating mode)

Fig. 2-12 REEL TABLE DRIVE (SIDE VIEW)

2-3-2. Reel Table Drive Clutch Lock and Release Mechanism

As described in the preceding section, using the selection of the step gear (CLUTCH MECHANISM), two mechanisms which are driven by being selected via direct drive or via FRICTION MECHANISM from the capstan motor, to execute the reel table drive. The operating status of the clutch lock and the releasing mechanism is shown in Fig. 2-13.

Fig. 2-13 ① shows the tape unloading position (INITIAL position) when the power for the mechanism operating mode is switched off.

At that times all the levers are in the initial positions, and the clutch is released also so that a route for reel table drive is created via a friction mechanism.

Fig. 2-13 ② shows that the mechanism operation mode has executed the tape loading and that it has completed its movement to the STOP (stand-by), FF/REW position.

At this time, the CLUTCH ACT LEVER is operated by the hook of the ACT BRAKE SLIDE to move the ACT CLUTCH LEVER in the direction of arrow via the CLUTCH LEVER and the CLUTCH CHANGE LEVER. Now, the up and down STEP GEAR is placed into the direct coupled state. In the FF/REW mode, the reel table is directly driven so that the rotation of the capstan motor is directly transmitted to make high-speed rotation drive possible. When shifting the mode to the STOP from the FF/REW in this condition, the mechanism mode position is once moved back to the brake position, and when the reel table brake is instantaneously applied, the clutch is released once at the same time, after which it returns to the same mechanism mode as the FF/REW mode once again. Now, it is placed in a waiting state in the same condition of the STOP mode as shown in Fig. 2-13 ②.

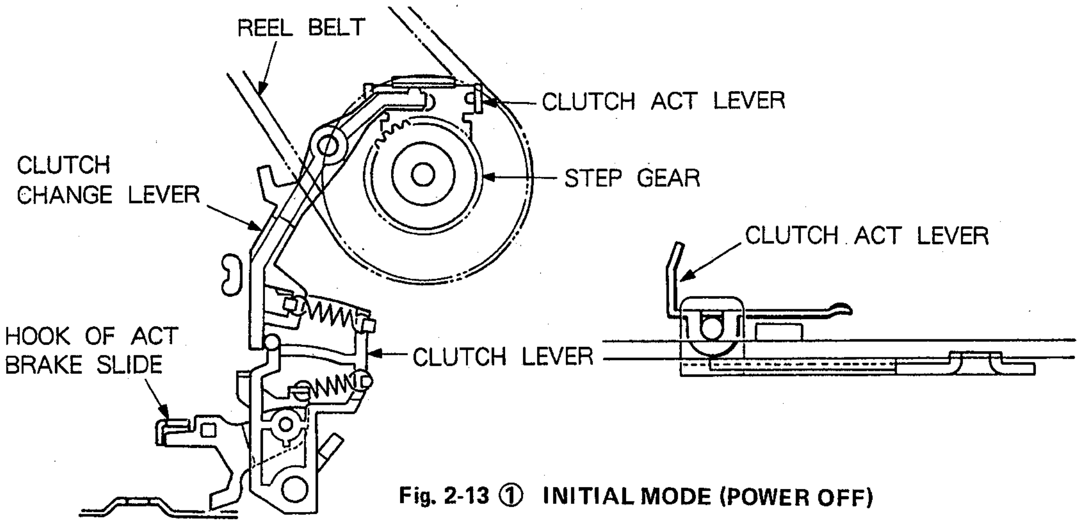

REEL BELT
CLUTCH ACT LEVER
STEP GEAR
CLUTCH CHANGE LEVER
CLUTCH ACT LEVER
HOOK OF ACT BRAKE SLIDE
CLUTCH LEVER

Fig. 2-13 ① INITIAL MODE (POWER OFF)

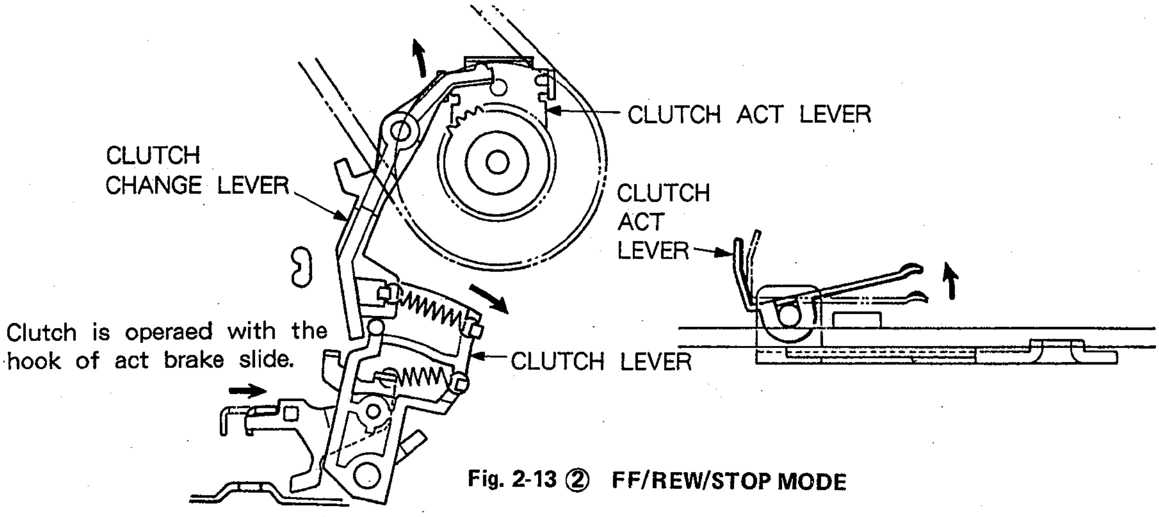

CLUTCH ACT LEVER
CLUTCH CHANGE LEVER
CLUTCH ACT LEVER
Clutch is operaed with the hook of act brake slide.
CLUTCH LEVER

Fig. 2-13 ② FF/REW/STOP MODE

Fig. 2-13 ① – ③ REEL TABLE DRIVE CLUTCH LOCK AND RELEASE MECHANISM

Fig. 2-13 ③ shows the completion state of a shift to the PLAY mode via the STILL mode from the STOP (FF/REW) mode for the mechanism mode position.

In the case of this mode shifting, the movement of the BRAKE ACT SLIDE remains fixed. So, the CLUTCH ACT LEVER should be unlocked by the movement of the hook of the MAIN SLIDE PLATE to cause the clutch to be released. This movement in turn causes the capstan motor rotation to be transmitted via the friction mechanism. So, the constant speed rotation drive necessary for the PLAY (REC) mode and SEARCH mode is made possible.

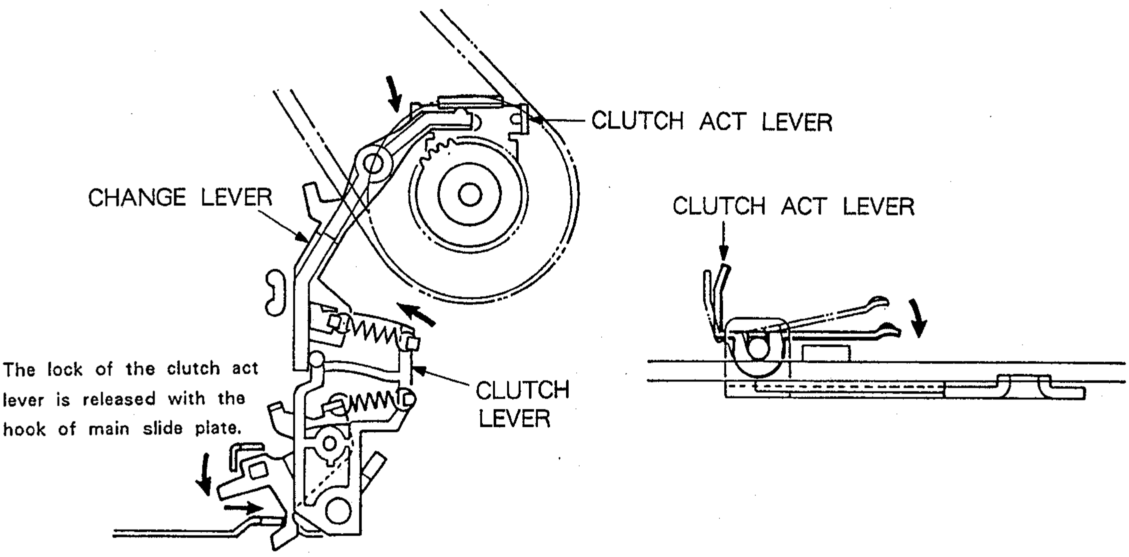

CLUTCH ACT LEVER
CHANGE LEVER
CLUTCH ACT LEVER
The lock of the clutch act lever is released with the hook of main slide plate.
CLUTCH LEVER

Fig. 2-13 ③ FF/REW/STOP MODE → STILL MODE → PLAY MODE

2-4. FRONT LOADING DRIVE SELECTION MECHANISM

In the P-90 mechanism, the motor dedicated to the use of front loading is not employed. The drive source is utilized instead of the tape loading motor. As shown in Fig. 2-14 ⓐ/ⓑ, during the front loading the FRONT LOAD WORM GEAR directly coupled to the tape loading motor axle and the FRONT HELICAL GEAR with several teeth missing are engaged with each other and rotated for transmission of the drive force to the front loading mechanism. When the cassette tape is inserted completely in the mechanism, the FRONT HELICAL GEAR is automatically disengaged from the FRONT LOAD WORM GEAR. After that, the tape loading operation is performed without the tape loading motor drive force being transmitted to the front loading mechanism.

While the drive force is being transmitted to the front loading mechanism, the CAM GROOVEs of the before-mentioned MAIN CAM GEAR and the MODE CAM GEAR are flat in cam line pattern. These are therefore held without changing the mode state of the mechanism in any way.

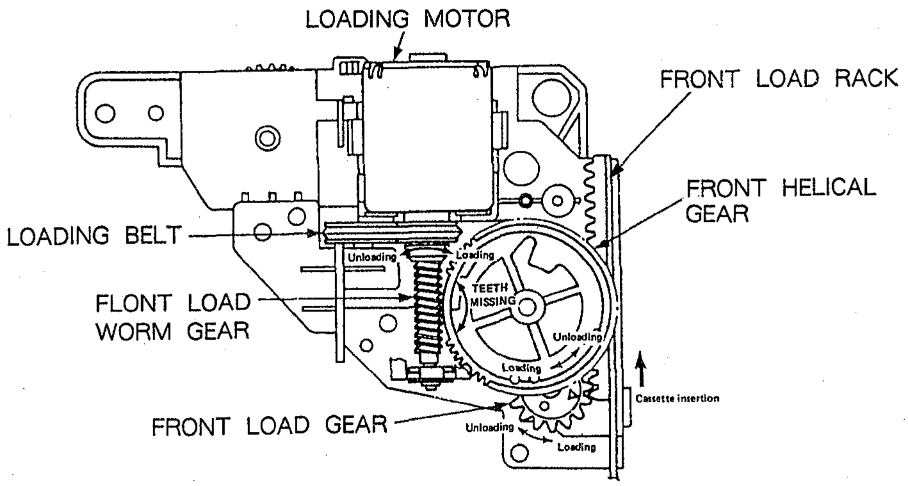

LOADING MOTOR
FRONT LOAD RACK
FRONT HELICAL GEAR
LOADING BELT
Unloading
Loading
TEETH MISSING
FLONT LOAD WORM GEAR
Unloading
Loading
Cassette insertion
FRONT LOAD GEAR
Unloading
Loading

Fig. 2-14 ⓐ FRONT LOADING DRIVE SELECTION MECHANISM (CASSETTE INSERTED POSITION)

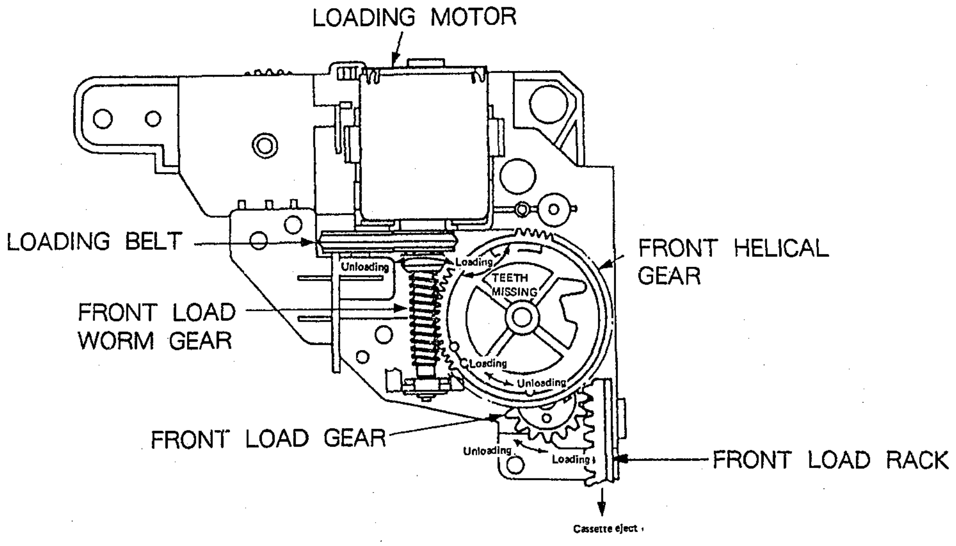

LOADING MOTOR
LOADING BELT
Unloading
Loading
TEETH MISSING
FRONT HELICAL GEAR
FRONT LOAD WORM GEAR
Loading
Unloading
FRONT LOAD GEAR
Unloading
Loading
FRONT LOAD RACK
Cassette eject

Fig. 2-14 ⓑ FRONT LOADING DRIVE SELECTION MECHANISM (CASSETTE EJECTED POSITION)

(A) Cassette inserting operation

When inserting a cassette from the cassette ejected state of Fig. 2-14 ⓑ, the FL START SWITCH shown in Fig. 2-15 is turned OFF, to cause the loading motor to be rotated in the direction of insetting. As a result, the FRONT LOAD RACK is drawn in, and the front loading is made up to the cassette tape completion point. So, it is locked in the grooves shown in Fig. 2-15 to complete cassette inserting. At that time, the FRONT HELICAL GEAR is positioned at ⓐ of Fig. 2-14, and is released from the front loading mechanism, therefore, the tape loading operation is continuously performed.

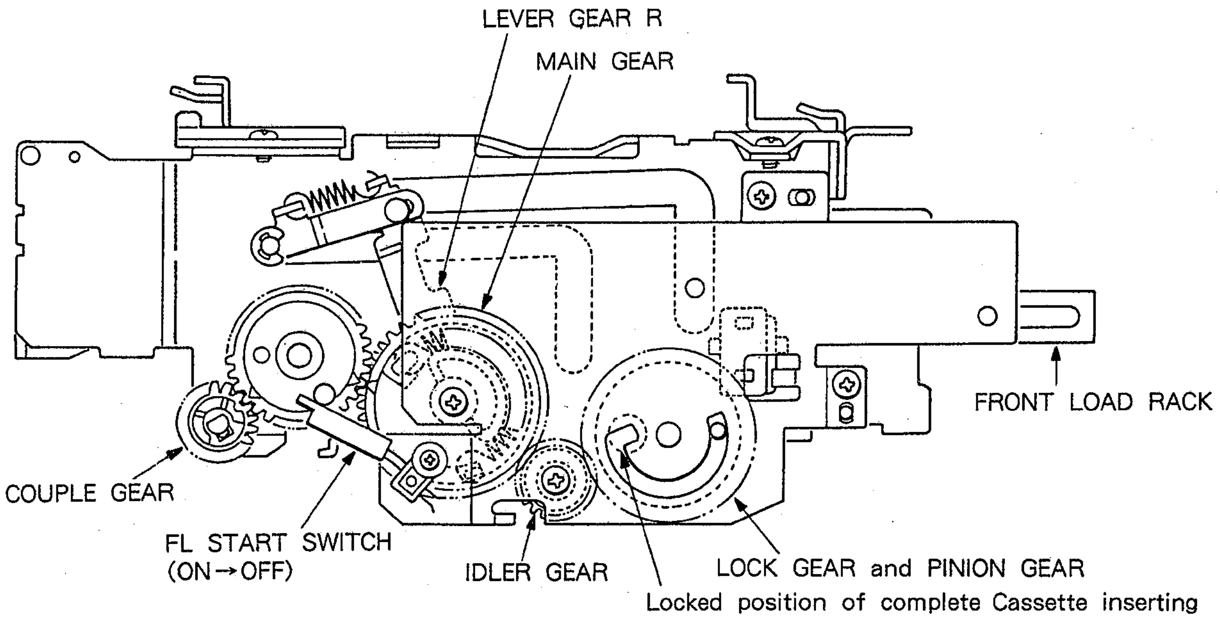

LEVER GEAR R
MAIN GEAR
FRONT LOAD RACK
COUPLE GEAR
FL START SWITCH
(ON→OFF)
IDLER GEAR
LOCK GEAR and PINION GEAR
Locked position of complete Cassette inserting

Fig. 2-15 CASSETTE HOLDER MECHANISM (CASSETTE INSERTING OPERATION)

(B) Cassette ejection operation

The components of the front loading mechanism is shown in Fig. 2-16.

When ejecting the cassette from the inserted state shown in Fig. 2-14 ⓐ, the FRONT ACT LEVER is pushed in the direction of arrow due to the ACT SLIDE PLATE moves in the direction of arrow shown in Fig. 2-17. As a result, the FRONT LEVER assembly is turned counterclockwise via the FRONT LOAD SLIDE to cause the FRONT HELICAL GEAR to be engaged with the FRONT LOAD WORM GEAR of the loading motor. At that time, the loading motor is being rotated counterclockwise, so that the FRONT HELICAL GEAR is caused to be rotated counterclockwise also to carry out the front unloading via the FRONT LOAD GEAR and the FRONT LOAD RACK. At the same time, the FRONT ACT LEVER is operated counterclockwise by the hook of the FRONT HELICAL GEAR. This releases the lock being pushed in the direction of arrow indicated by the ACT SLIDE PLATE. So, the FRONT LOAD SLIDE assembly now moves to the initial position to prepare for the next ejection operation. Incidentally, the movement of the FRONT LEVER assembly performs an important function of positioning the FRONT HELICAL GEAR (Fig. 2-14 ⓐ) upon completion of cassette mounting, in addition to the cassette eject start-up operation.

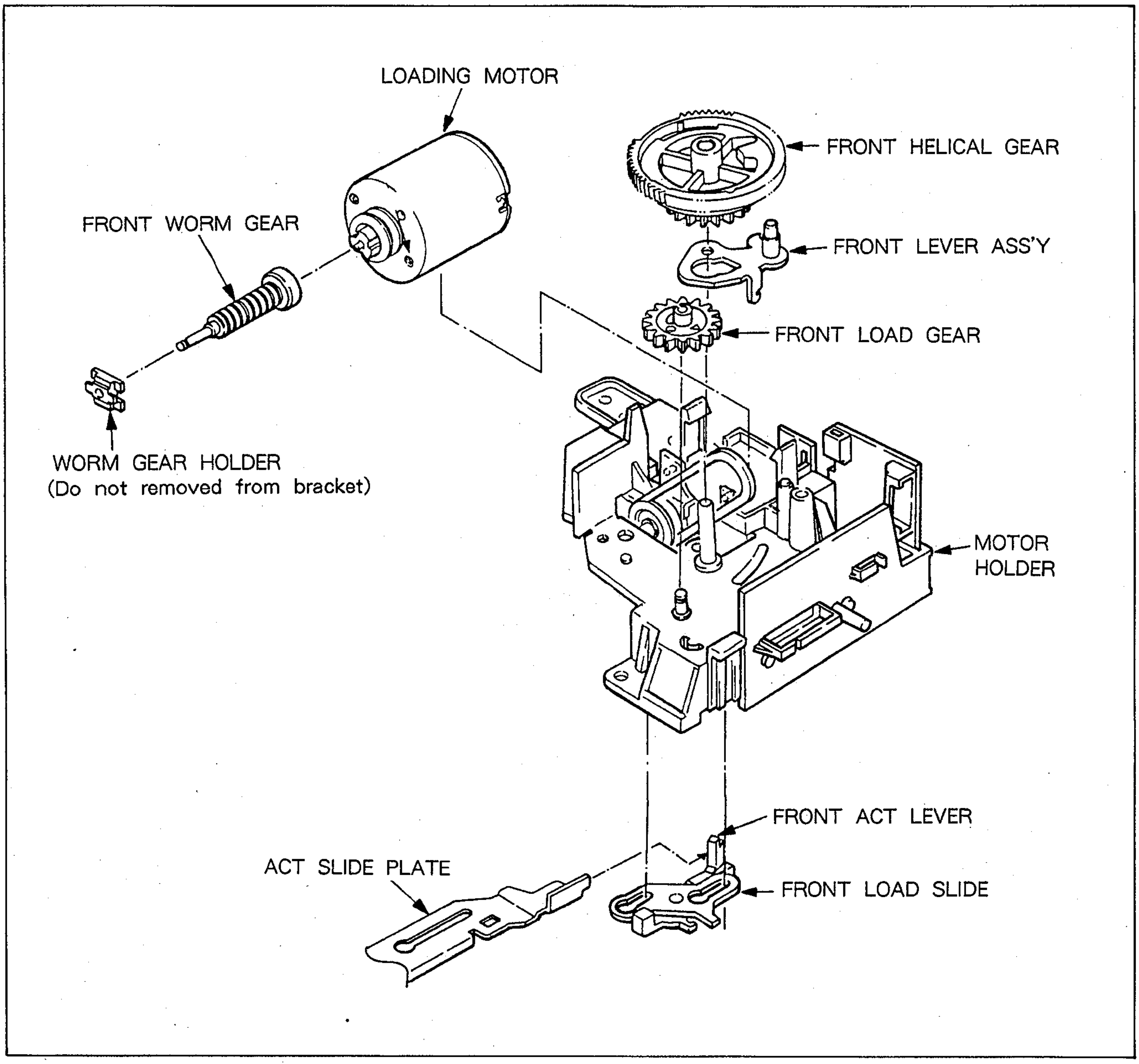
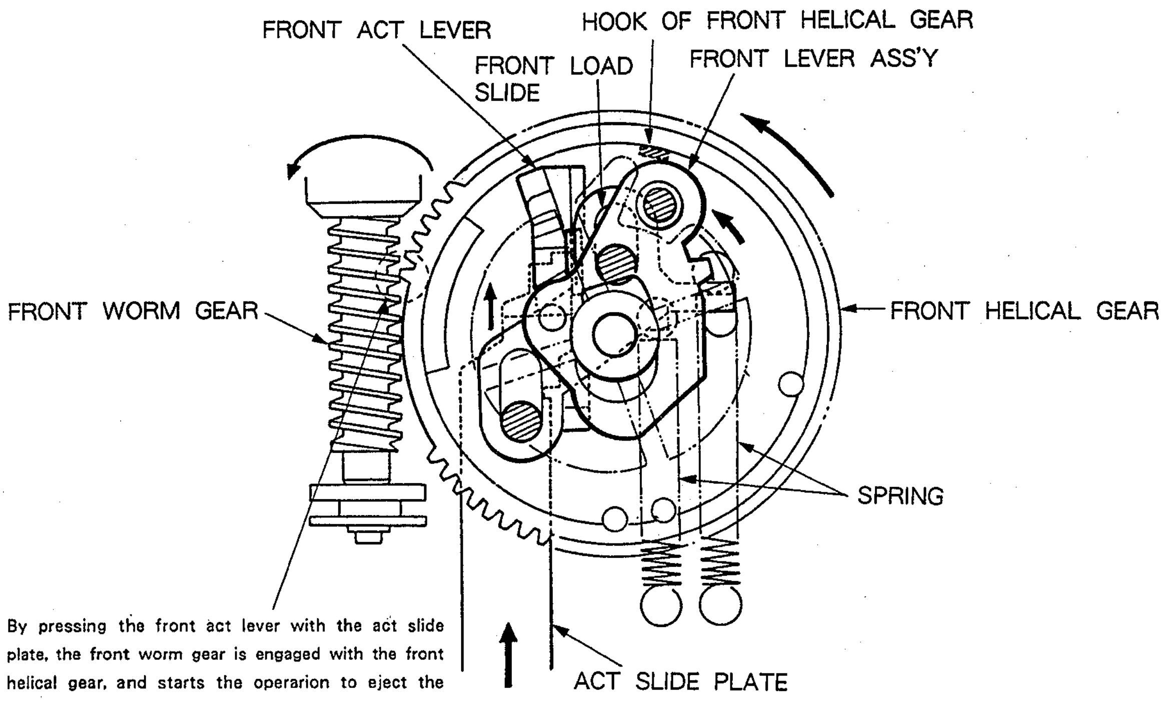

LOADING MOTOR
FRONT HELICAL GEAR
FRONT WORM GEAR
FRONT LEVER ASS'Y
FRONT LOAD GEAR
WORM GEAR HOLDER
(Do not removed from bracket)
MOTOR
HOLDER
FRONT ACT LEVER
ACT SLIDE PLATE
FRONT LOAD SLIDE

Fig. 2-16 FRONT LOADING DRIVE SELECTION MECHANISM


FRONT ACT LEVER
HOOK OF FRONT HELICAL GEAR
FRONT LOAD SLIDE
FRONT LEVER ASS'Y
FRONT WORM GEAR
FRONT HELICAL GEAR
SPRING
ACT SLIDE PLATE

By pressing the front act lever with the act slide plate, the front worm gear is engaged with the front helical gear, and starts the operarion to eject the cassette.

Fig. 2-17 CASSETTE EJECTION START OPERATION (See through top view)

2-5. CASSETTE HOLDER MECHANISM

2-5-1. Components

The exploded view of the cassette holder mechanism is shown in Fig. 2-18. This mechanism consists of a cassette tray for feeding the cassette tape to the specified position of the mechanism chassis, a side plate provided with L type holes for supporting and guiding it, the top plate for regulating the width of left and right, and a group of gears for driving the cassette tray.
The entire mechanism is of independent construction apart from the mechanism body. The holder is fixed on the mechanism chassis by inserting the pawls at two points and tightening the setscrews at two points, or at a total of four points.

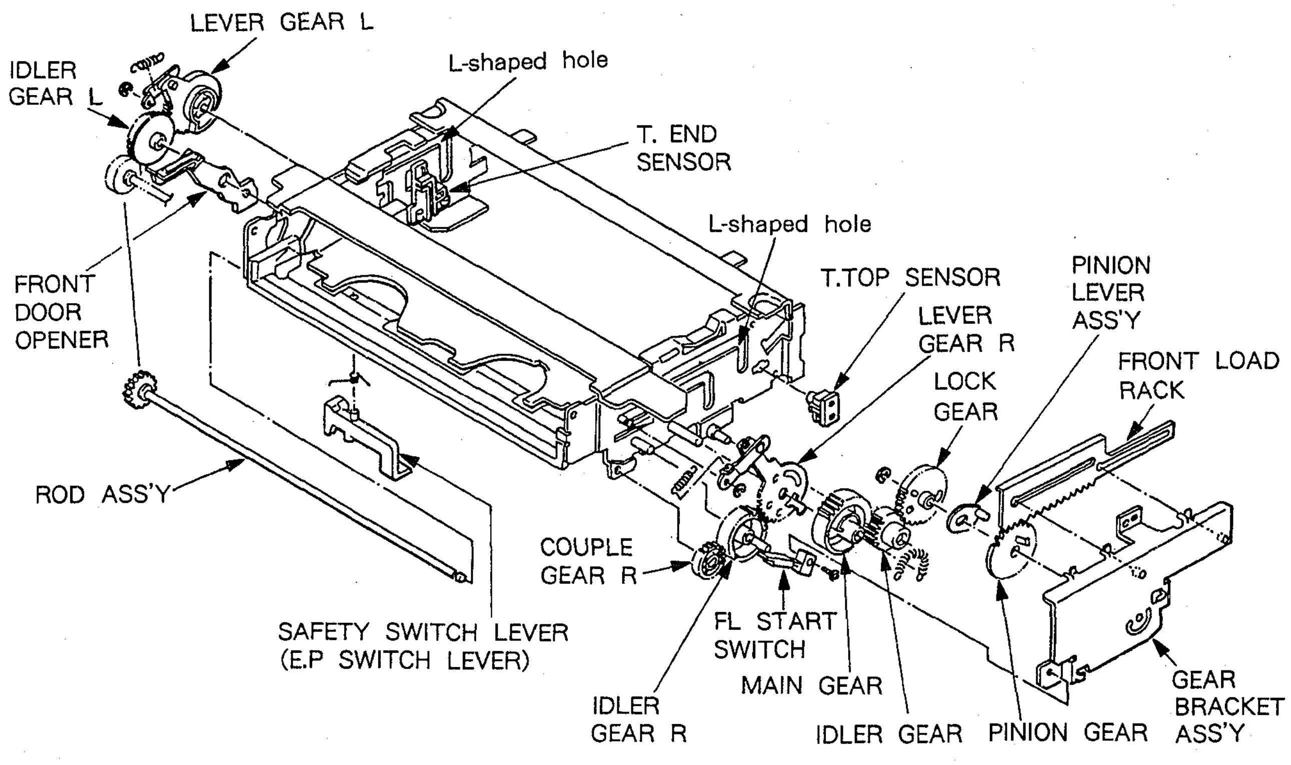

LEVER GEAR L
IDLER GEAR L
L-shaped hole
T. END SENSOR
L-shaped hole
FRONT DOOR OPENER
T.TOP SENSOR
PINION LEVER ASS'Y
LEVER GEAR R
FRONT LOAD RACK
LOCK GEAR
ROD ASS'Y
COUPLE GEAR R
SAFETY SWITCH LEVER (E.P SWITCH LEVER)
FL START SWITCH
MAIN GEAR
IDLER GEAR R
IDLER GEAR
PINION GEAR
GEAR BRACKET ASS'Y

Fig. 2-18 EXPLODED VIEW OF THE CASSETTE HOLDER MECHANISM

2-5-2. Description of Cassette Holder

The cassette holder is of motor-less design, as the lowering of mechanism height and driving source are done by the loading motor of the mechanism body.

As a substitute for the worm gear system hitherto used in the major drive section for the drive selection mechanism mentioned in section 2-4., the RACK LOADING system is adopted in this cassette holder mechanism. By this mechanism the motor-less design can be realized. An exploded view of the mechanism is shown in Fig. 2-19. A description of the operation is made below along with Fig. 2-19. To press-fit the cassette tape after sending it onto the mechanism chassis, the PINION GEAR section is triple construction. The FRONT LOAD RACK side and the IDLER GEAR side are independently engaged. The PINION GEAR and the LOCK GEAR are connected from the PINION LEVER PIN riveted to the PINION LEVER. Even after feeding the cassette tape to the specified position of the mechanism chassis, the FRONT LOAD RACK slides, giving the rotation to the PINION GEAR which is engaged with the FRONT LOAD RACK. At that time, a pin is dropped into the groove section provided on the GEAR BRACKET ASS'Y.

The other LOCK GEAR is fixed by this PINION LEVER PIN, and the cassette tape is press-fitted onto the mechanism chassis by linked IDLER GEAR. The before-mentioned FRONT LOAD RACK and the PINION GEAR are set free after dropping the PINION LEVER PIN into the groove section. So, the drive force of the loading motor is sent to the mechanism body.

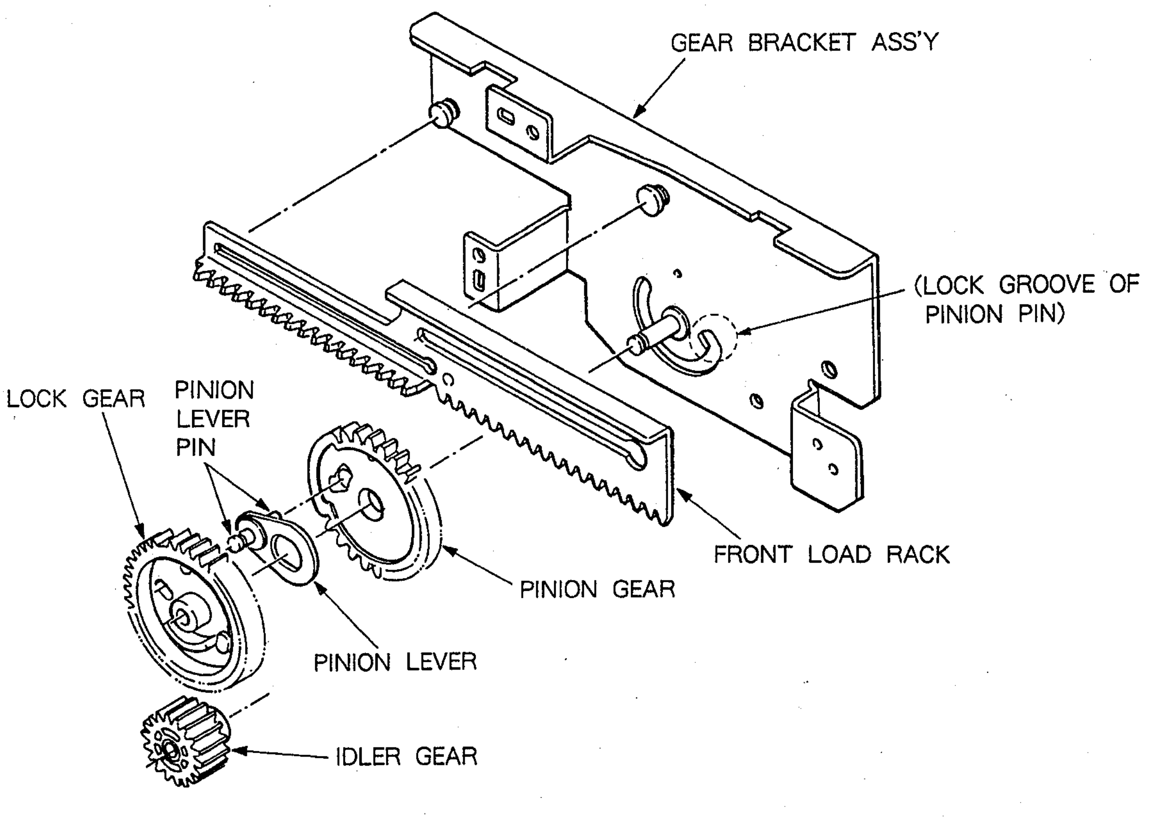


Fig. 2-19 RACK LOADING MECHANISM OF CASSETTE HOLDER

3. MECHANISM CONTROL

3-1. MODE ARRANGEMENT

This mechanism is arranged in such a mode layout as shown in Table. 3-1 and as described in section 2-1. The mode sensing switch described below is used for control of these modes.

3-2. MODE DETECTION SWITCH

For mode detecting one leaf switch (FL START SWITCH and one rotary switch (MECHANISM MODE SWITCH) are used in combination.

Mechanism Mode	Mechanism Mode Switch			HEX DATA	Function	VTR Operation Mode
	3	2	1			
EJECT	–	–	–		Eject position	EJECT
					Front loading/Unloading	
SHORT REW	–	–	–		Take up operation in the tape end position	Low side of ⑥. Sensed upon IN
INITIAL	1	1	1	⑦	Power off position	Power off when tape is loaded completely
					Tape unloading position Tape loading Tape loading ending position	
BRAKE	0	0	1	①	Main brake applying position	
STOP / FF/REW	0	1	0	②	STOP waiting and FF/REW (the head motor rotation)	STOP, FF/REW
STILL	0	1	1	③	The positions of STILL, SLOW or F-ADV.	STILL, SLOW, F-ADV
PLAY	1	0	0	④	From FWD direction Normal running mode	PLAY, REC, F-SEARCH
IDLER	1	0	1	⑤	Forward/reverse changeover position	PAUSE
REV	1	1	0	⑥	From REV direction Normal running mode	R-SEARCH

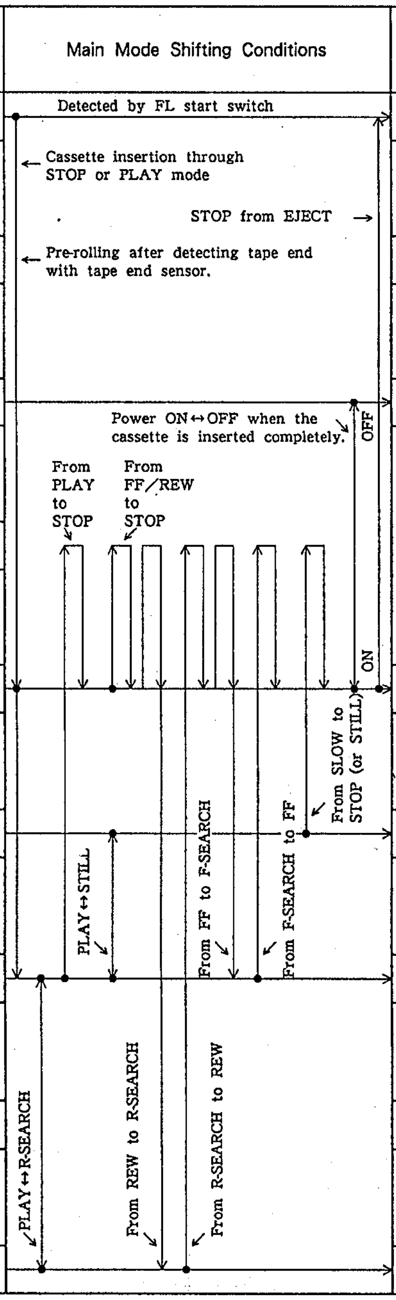

Main Mode Shifting Conditions
Detected by FL start switch
Cassette insertion through STOP or PLAY mode
STOP from EJECT
Pre-rolling after detecting tape end with tape end sensor.
Power ON↔OFF when the cassette is inserted completely.
OFF
ON
From PLAY to STOP
From FF/REW to STOP
From SLOW to STOP (or STILL)
PLAY↔STILL
From FF to F-SEARCH
From F-SEARCH to FF
PLAY↔R-SEARCH
From REW to R-SEARCH
From R-SEARCH to REW

Table 3-1

(1) Switch component
The mode switch consists of FL START SWITCH for detecting the cassette ejection and insertion, and MECHANISM MODE SWITCH for detecting the each mode position of the mechanism. As can be understood from Fig. 3-1, the MECHANISM MODE SWITCH rotates in excess of 360 degrees. Therefore, the sensing of a signal from the MECHANISM MODE SWITCH is done by the leaf switch.
In the P88 and P89 mechanisms, incidentally, short REW position is detected by the FL END SW, but in the P90 mechanism, the FL END SWITCH is not required due to a change in the internal structure of the MECHANISM MODE SWITCH.

(2) Mechanism mode switch
The mechanism mode switch consists of four terminals, namely, COM, DATA1, DATA2, and DATA3. These are processed as 3-bit signals for discrimination of seven modes.
The MECHANISM MODE SWITCH is not interchangeable with the hither to available black switch due to a change in its internal structure. Be sure therefore to use a blue switch.

3-3. CONSIDERATION TO FULL LOADING

① In the normal stop condition, the head drum is rotated to facilitate the start-up of the image at the time of playback, but it is conceivable that this is left undisturbed for an extended period of time. This may result in wear of the video head. For this reason, when five minutes elapse from the stop condition, the head drum stops rotating.

② To prevent the tape from being caught in the head drum due to dew forming, etc., the tape is housed in the unloaded cassette when turning the power off.

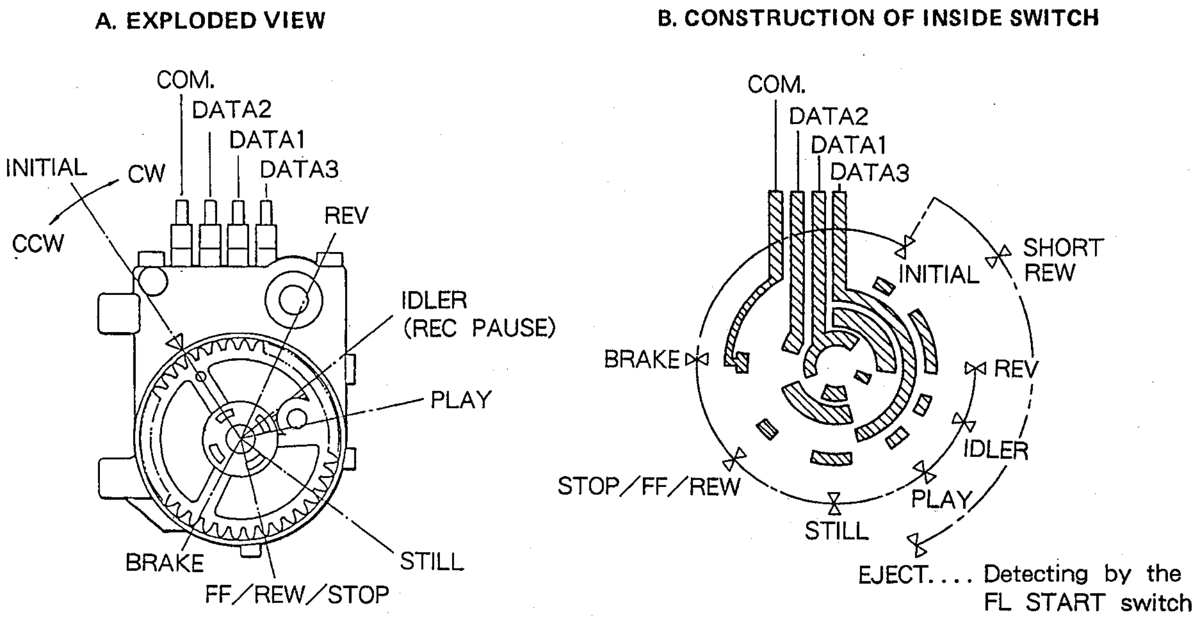

A. EXPLODED VIEW
COM.
DATA2
DATA1
DATA3
INITIAL
CW
CCW
REV
IDLER
(REC PAUSE)
PLAY
BRAKE
STILL
FF/REW/STOP
B. CONSTRUCTION OF INSIDE SWITCH
COM.
DATA2
DATA1
DATA3
SHORT
REW
INITIAL
BRAKE
REV
IDLER
STOP/FF/REW
PLAY
STILL
EJECT.... Detecting by the
FL START switch

Fig. 3-1 MECHANISM MODE SWITCH (ROTARY SWITCH)

4. MECHANISM MAINTENANCE AND CHECKING

4-1. PERIODIC CHECKING AND MAINTENANCE ITEMS AND SERVICE JIGS

The following maintenance and periodic checking procedures are recommended to ensure proper operation, and to protect the tape from dirt and damage. Also, these procedures should always be followed after repairing the unit.

4-1-1. Periodic Check Items

○ Cleaning ◎ Confirmation △ Lubrication

Part	Usage Time (hours)	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	Remarks
Tape Guide System	Tape running surfaces	○	○	○	○	○	○	○	○	○	○	
	ACE head	○	○	○	○	○	○	○	○	○	○	
	Drum (cylinder)	○	○	○	○	○	○	○	○	○	○	Head life depends heavily on operating conditions.
Drive System	Loading belt	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	
	Reel drive belt	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	
	Intermediate gear, pulley axles		△		△		△		△		△	Absolutely avoid oil on tape running surfaces.
	Capstan axles		△		△		△		△		△	
	Loading motor		◎		◎		◎		◎		◎	
Performance Check	Back tension torque		◎		◎		◎		◎		◎	47 ± 5 gcm
	Brake system		◎		◎		◎		◎		◎	
	FF, REV, PLAY torque		◎		◎		◎		◎		◎	FF : 600 gcm and over REW:750 gcm and over REV : 150 to 240 gcm PLAY : 100 to 160 gcm

Note : The back tension torque is the value that has been measured by the cassette torque meter (VHJ-0016).
The torque of FF, REV, REW, and PLAY represent those measured with them locked by the torque gauge.
FF and REW are values 2 seconds after starting.

4-1-2. Cleaning

① Drum (COMPL CYLINDER) and Video Heads (See Fig. 4-1-1.)

1) Wrap a chamois leather around your finger and moisten it with methyl alcohol.
2) Move the chamois leather to left and right several times on the video head to clean. There is a video head also on the opposite side, so clean it likewise. In Hi-Fi models, clean the audio head also.
3) Clean the tape path surface of the cylinder in the same way.

Note : Always turn power off before cleaning. Do never move the chamois leather vertically or apply too much force to the head ; it may be damaged.

② Cleaning of the Tape Guide System (See Fig. 4-1-2.)

1) Set the EJECT mode and clean the tape guide system (tape guides, impedance roller, FTE head, ACE head, pinch rollers, capstan axles, etc.) with a chamois leather moistened with methyl alcohol.

Note : Make sure that no oil, grease, etc. adhere to the chamois leather and that heads are not damaged.

③ Cleaning of the Drive System

1) Clean the drive system (loading belt, reel drive belt, pulley, supply reel table, etc.) with a soft cloth moistened with methyl alcohol.

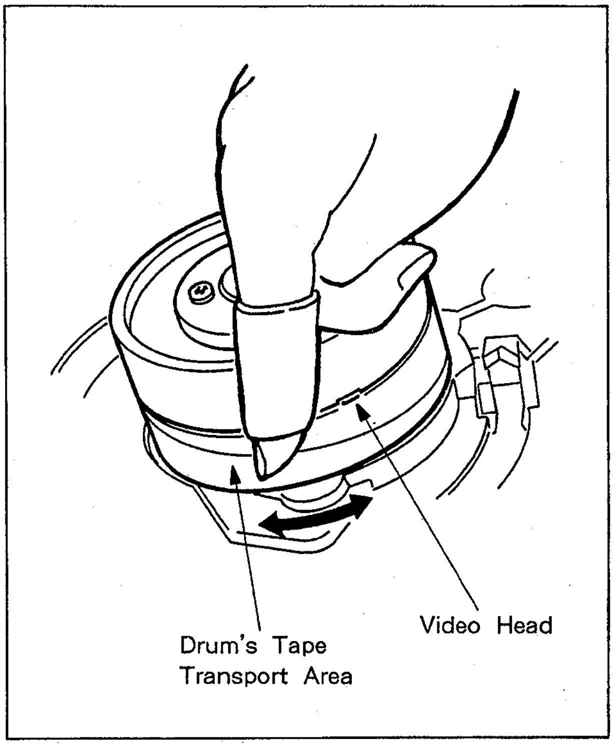

Video Head
Drum's Tape
Transport Area

Fig. 4-1-1.

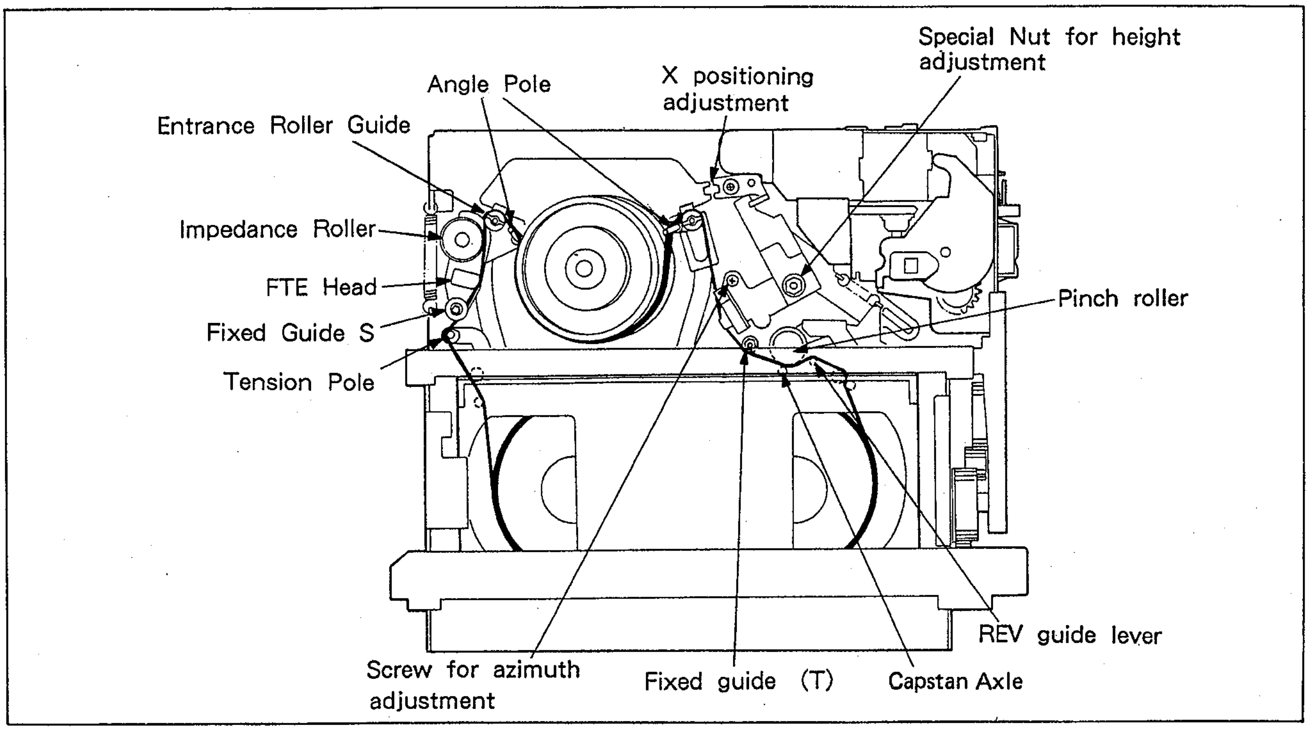
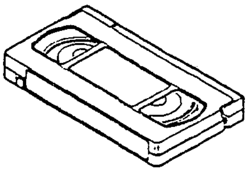
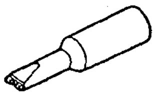
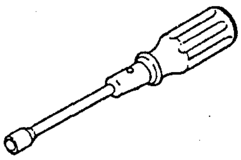
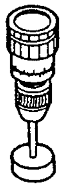
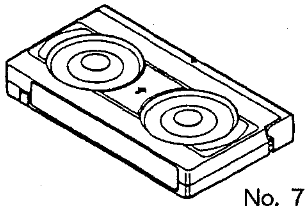
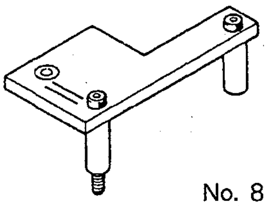
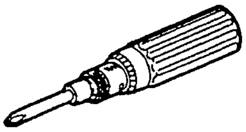
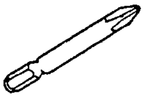
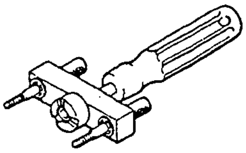
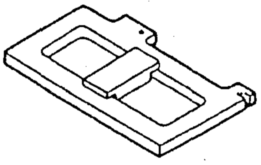
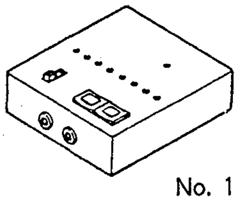
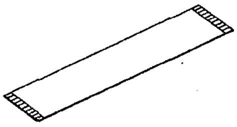
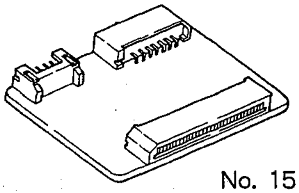
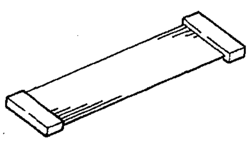
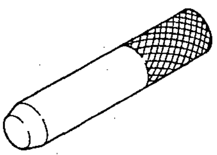
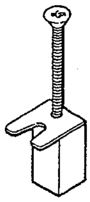

Special Nut for height adjustment
Angle Pole
X positioning adjustment
Entrance Roller Guide
Impedance Roller
FTE Head
Fixed Guide S
Tension Pole
Pinch roller
REV guide lever
Screw for azimuth adjustment
Fixed guide (T)
Capstan Axle

Fig. 4-1-2. Cleaning

4-1-3. Service Jigs

No.	Jig	Jig No.	Remarks
1	Alignment tape	VHJ-0008	SP color bar, 1kHz (normal)
2	Alignment tape	VHJ-0009	SP monoscope, 7kHz (normal)
3	Alignment tape	VHJ-0052	LP monoscope, 3kHz (normal)
4	Eccentric screwdriver	VHJ-0003	For tape path adjustment
5	Nut box	VHJ-0048	For tape path adjustment
6	Torque gauge	VHJ-0004	For reel take-up torque measurement
7	Cassette torquemeter	VHJ-0016	For back tension torque measurement
8	Position adjustment gauge	VHJ-0049	For position adjustment
9	Torque gauge screwdriver	VHJ-0014	For screw fastening torque adjustment
10	3mm dia. bit for torque screwdriver	VHJ-0045	Spare bit for the torque gauge screwdriver
11	Video head removing tool	VHJ-0041	For upper drum removal
12	Cassette stand plate gauge	VHJ-0001	For reel height adjustment
13	Mode selector	VHJ-0050	For mechanism mode selection
14	26-pin flexible flat cable	VHJ-0064	Spare cable for mode selector
15	Mode selector relay board	VHJ-0075	Relay board for mode selector
16	7-wire flat cable	VHJ-0076	Spare cable for relay board
17	REV guide lever removing tool	VHJ-0073	For REV guide lever removal
18	Fixed guide height gauge	VHJ-0053	For fixed guide (S) hight adjustment

VHJ-0008, VHJ-0009, VHJ-0052  No. 1, 2, 3	VHJ-0003  No. 4	VHJ-0048  No. 5	VHJ-0004  No. 6
VHJ-0016  No. 7	VHJ-0049  No. 8	VHJ-0014  No. 9	VHJ-0045  No. 10
VHJ-0041  No. 11	VHJ-0001  No. 12	VHJ-0050  No. 13	VHJ-0064  No. 14
VHJ-0075  No. 15	VHJ-0076  No. 16	VHJ-0073  No. 17	VHJ-0053  No. 18

4-2. MODE SELECTOR (VHJ-0050) HANDLING INSTRUCTIONS

The mode selector drives the loading motor of the P88 mechanism with its internal batteries (UM-2 × 4 = 6V), using LEDS to indicate the mode (EJECT, INITIAL, BRAKE, STOP/REW/FWD, STILL, PLAY, IDLER, REV) simultaneously with EJECT⇔REV mode changes.
Instead of the internal batteries, an external DC 6V power supply can also be used.

4-2-1. Part Names (See Fig. 4-2-1)

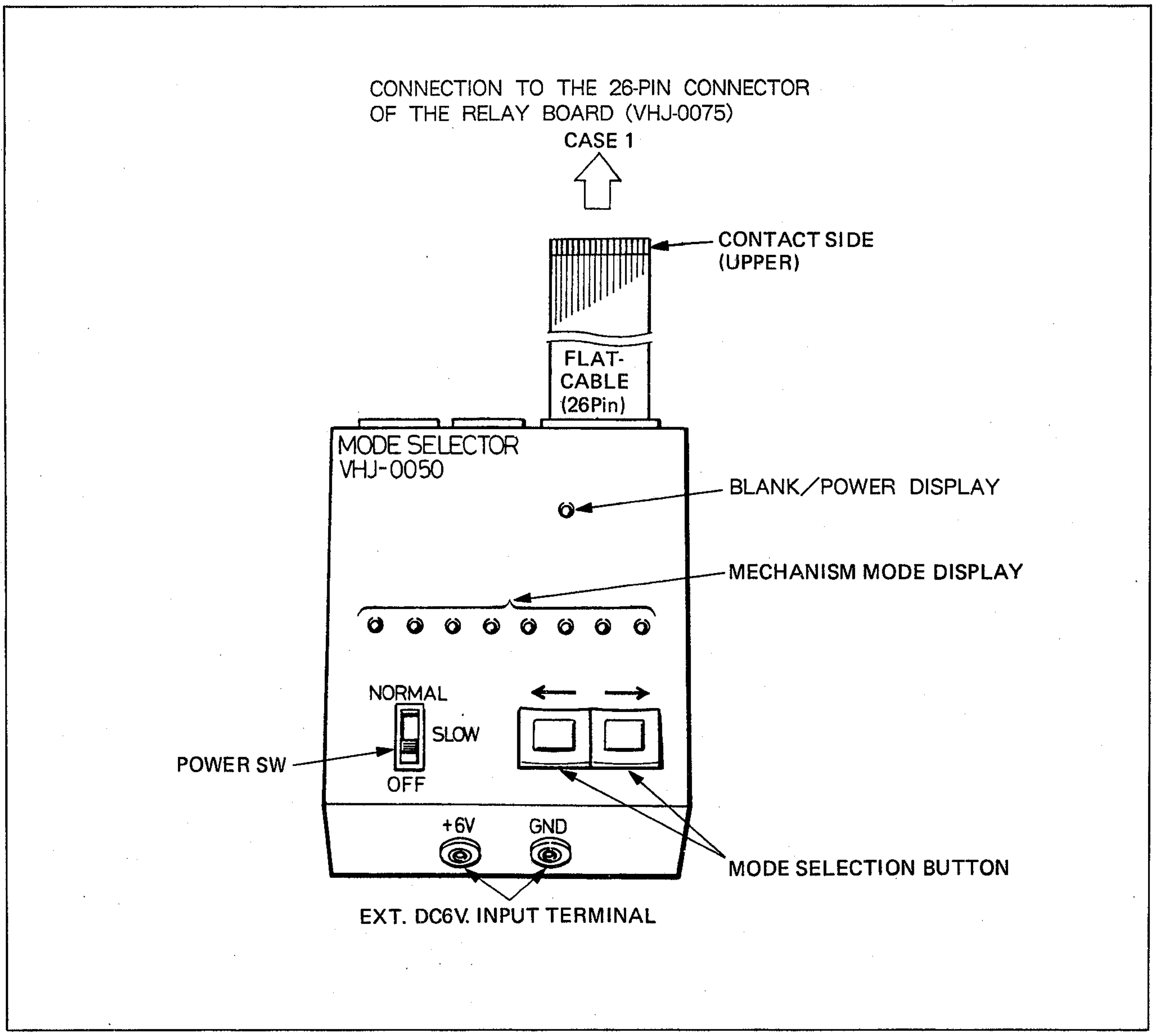
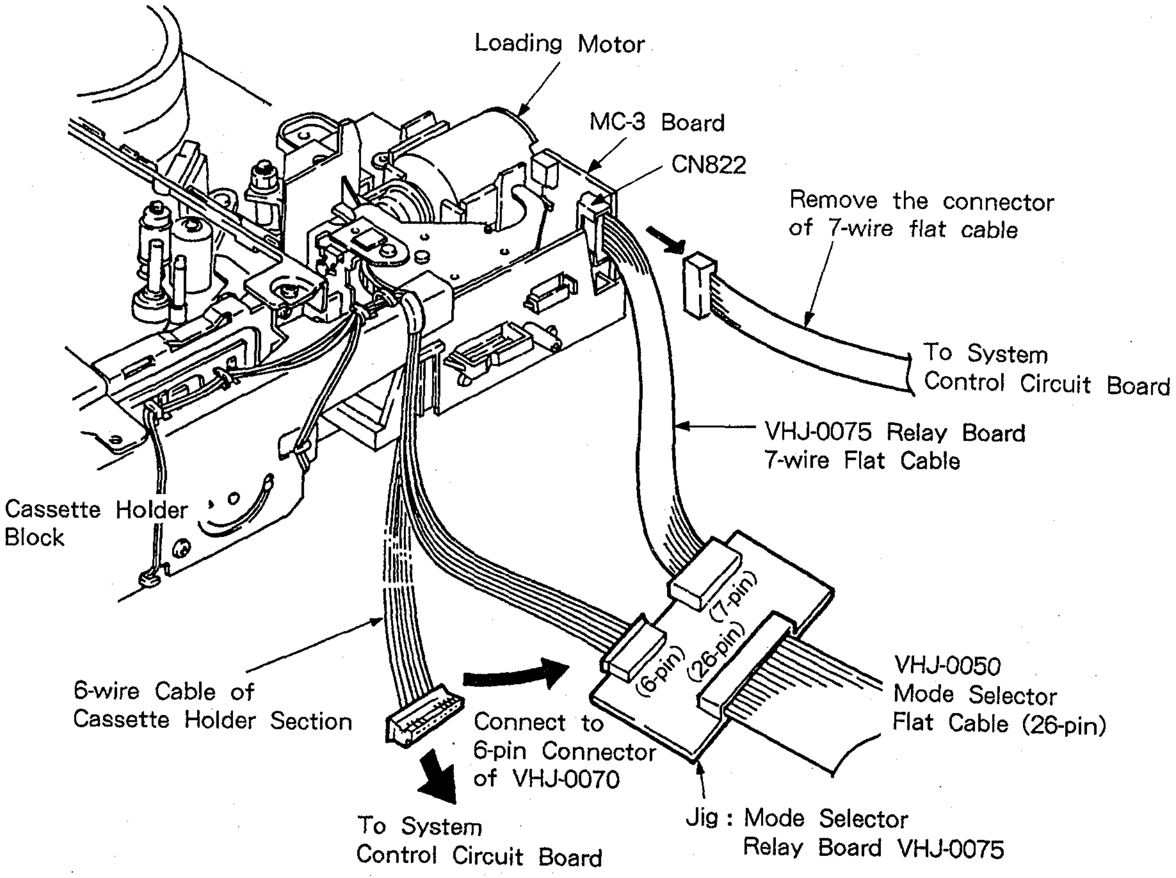

CONNECTION TO THE 26-PIN CONNECTOR OF THE RELAY BOARD (VHJ-0075)
CASE 1
CONTACT SIDE (UPPER)
FLAT-CABLE (26Pin)
MODE SELECTOR VHJ-0050
BLANK/POWER DISPLAY
MECHANISM MODE DISPLAY
NORMAL
SLOW
OFF
POWER SW
←
→
+6V
GND
MODE SELECTION BUTTON
EXT. DC6V. INPUT TERMINAL

Fig. 4-2-1

4-2-2. Connection Method (See Fig. 4-2-2)

1) Remove the 7-wire cable connected from the system control circuit to the connector (CN822) of the MC-3 board.
2) Connect the 7-wire cable (VHJ-0076) between the connector (CN822) of the MC-3 board and the 7-pin connector of the Mode Selector Connection Board (VHJ-0075).
3) Remove the 6-wire cable extending from the cassette holder section from the connector of the System Control Circuit Board and connect it to the 6-pin connector of the Mode Selector Connection Board (VHJ-0075).
4) Connect a supplied 26-pin flat cable (VHJ-0064) of the mode selector (VHJ-0050) between the mode selector body and the 26-pin connector of the Connection Board (VHJ-0075).

Note : Care should be taken to avoid mistaking the direction of the contacting side when connecting a flexible flat cable.



Loading Motor
MC-3 Board
CN822
Remove the connector of 7-wire flat cable
To System Control Circuit Board
VHJ-0075 Relay Board 7-wire Flat Cable
Cassette Holder Block
(7-pin)
(26-pin)
(6-pin)
VHJ-0050 Mode Selector Flat Cable (26-pin)
6-wire Cable of Cassette Holder Section
Connect to 6-pin Connector of VHJ-0070
To System Control Circuit Board
Jig : Mode Selector Relay Board VHJ-0075

Fig. 4-2-2 Connection

4-2-3. Handling Method

1) Keep the right side (⇨) of the mode selector key pressed, and the mode will change in the following sequence : EJECT⇨INITIAL⇨BRAKE⇨STOP/REW/FWD⇨STILL⇨PLAY⇨IDLER⇨REV.
2) When changing the mode in the REV···⇨EJECT direction, press the left side (⇦) of the mode selector key until the desired mode is indicated.
3) In the mid position of each mode during a shift to other mode, the "BLANK" LED lights. But the "PLAY", "IDLER", "REV" LEDs light between the EJECT mode and the INITIAL mode. Be sure therefore to check the mechanism body to see just what state the mechanism is in.
   Incidentally, if the mode selector is not connected to the mechanism, the "BLANK" LED lights to indicate the power ON.
4) The SLOW position of POWER switch makes relatively slow motions in comparison with the NORMAL position.

Note 1 : The mode selector drives the loading motor only, not affecting the head drum motor and the capstan motor. When using the mode selector with a cassette loaded, turn the capstan motor manually to remove tape slackness, preventing tape entanglement.

Note 2 : If the left side (⇦) of the mode selector (VHJ-0050) key is kept pressed with the COMPL cassette mechanism removed, it might get past the EJECT position, causing the front helical gear and the front worm gear to get disengaged.

In this condition, since the front helical gear will not turn even if the right side (⇨) of the mode selector key is pressed, rotate (push) the front helical gear clockwise by hand and engage it with the front worm gear. In this condition, as there is a misalignment between the mechanism main body operation mode (indicated by the mode selector indicator lamps) and the front loading mechanism operation mode, keep the right side (⇨) of the mode selector key pressed until the front helical gear and the front loading gear of the front loading mechanism get back to the initial condition (Refer to A and B in Fig. 4-5-5 of section 4-5-2. Loading Motor).

When the front loading mechanism returns to the initial condition, operation mode of the whole mechanism gets back to normal, matching the mode shown by the mode selector indicator lamps (mode is not properly indicated, however, during EJECT to INITIAL).

Sometimes, engagement of the front helical gear with the front worm gear is delayed, operation mode of the mechanism main body gets too much ahead and the front loading mechanism mode cannot be switched to the initial condition. In that case, press the left side (⇦) of the mode selector key, setting the mechanism main body operation mode back to EJECT (rotation of the mode cam and the MAIN CAM stops).

Note 3 : The mode selector indicator lamps show the mechanism operation mode, but the EJECT lamp may sometimes fail to indicate the actual mechanism operation mode.

5. MECHANISM DISMANTLING AND REASSEMBLING

5-1. MECHANISM MAIN UNIT (See Fig. 5-1-1.)

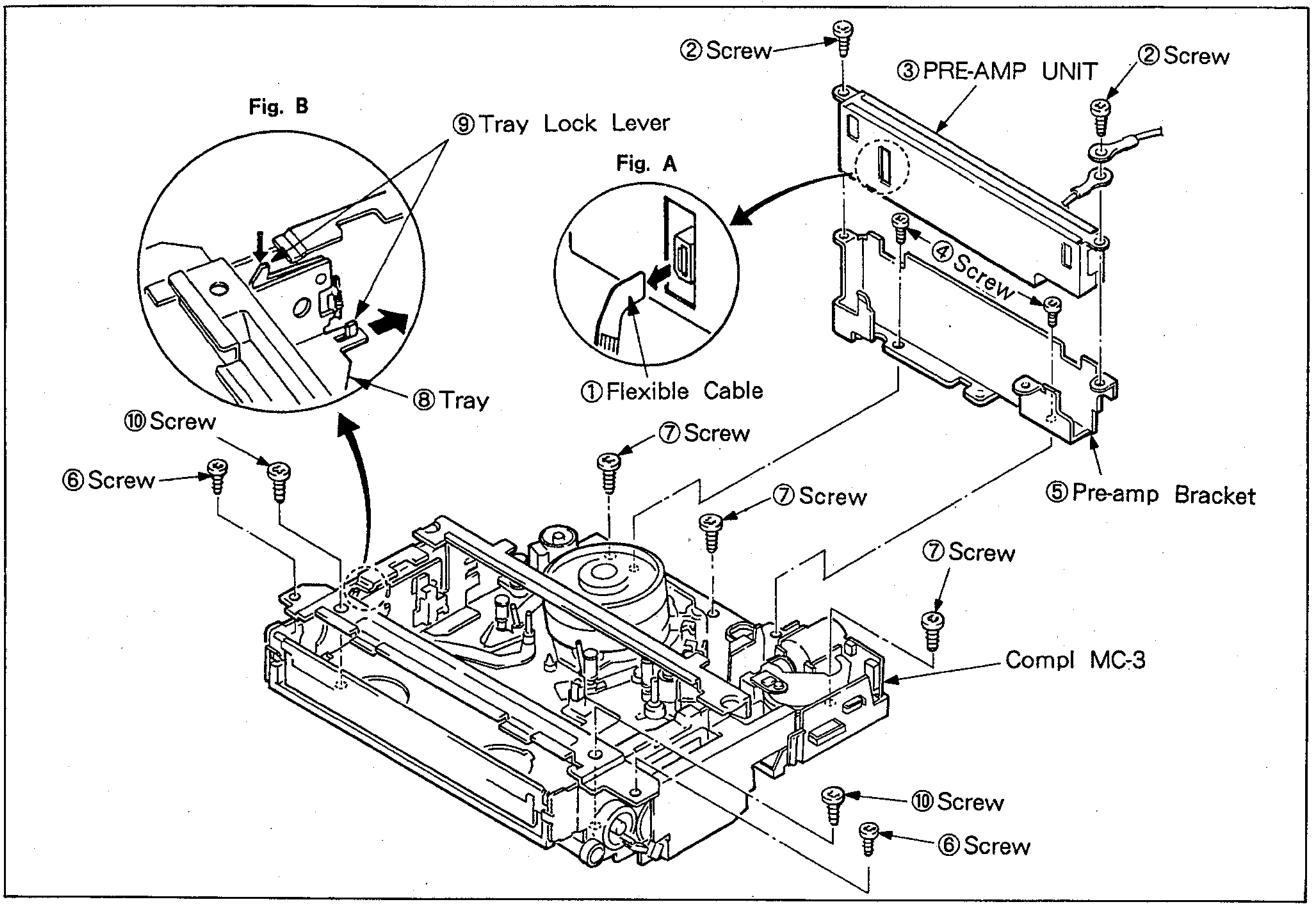
1. Removal

1) Remove the connectors of the COMPL MC-3 and the COMPL HEAD BRACKET.
2) Remove the flexible cable ① connecting the COMPL CYLINDER to the PRE-AMP UNIT ③ (See Fig. A).
3) Remove the two screws ②, then remove the PRE-AMP UNIT ③.
4) Remove the screw ④, then remove the PRE-AMP. BRACKET ⑤.
5) Remove the two screws ⑥.
6) Remove the three screws ⑦ and two screws ⑩, then lift up the mechanism main unit and remove it.
   Since the TRAY ⑧ obstructs removal of the two front screws ⑩, move the TRAY LOCK LEVER ⑨ in the direction of the arrow to unlock, then slide the TRAY ⑧ before removing the screws. (See Fig. B)

Note : Shape of the PRE-AMP UNIT ③ and the PRE-AMP. BRACKET ⑤ differ depending on the model.

2. Remounting

1) Mount the mechanism main unit onto the chassis with the three screws ⑦ and two screws ⑩.
2) Tighten the two screws ⑥.
3) Mount the PRE-AMP. BRACKET ⑤ with the two screws ④.
4) Mount the PRE-AMP UNIT ③ and the ground lug with the two screws ② (some models are not provided with a ground lug).
5) Insert the flexible cable ① into the connector of the PRE-AMP UNIT.
6) Connect the connectors of COMPL MC-3 and COMPL HEAD BRACKET.



②Screw
③PRE-AMP UNIT
②Screw
Fig. B
⑨Tray Lock Lever
Fig. A
④Screw
⑧Tray
①Flexible Cable
⑩Screw
⑦Screw
⑥Screw
⑦Screw
⑤Pre-amp Bracket
⑦Screw
Compl MC-3
⑩Screw
⑥Screw

Fig. 5-1-1 Mecahnism Main Unit

5-2. CASSETTE HOLDER MECHANISM

5-2-1. COMPL Cassette Mechanism (See Fig. 5-2-1.)

1. Removal

1) Set the video main unit to the EJECT completed mode.
2) Pull out the connectors (6-PIN CONNECTOR connected to the system control circuit board, ACE HEAD CONNECTOR, and FTE HEAD CONNECTOR) from CASSETTE HOLDER.
3) Remove the two screws ①.
4) Remove the two screws ②.
5) Lift up the COMPL CASSETTE MECHANISM ④ back a little and remove the two hooks ③ on the front (See Fig. B). When doing so, make sure that the SAFETY SWITCH LEVER is not caught by the mechanism chassis.

2. Remounting

1) Set the chassis section mechanism to the EJECT mode with the mode selector (VHJ-0050) (looking from above, match the front loading gear hole ⑤ with the MOTOR HOLDER hole ⑥ as shown in Fig. A).
2) Set the COMPL CASSETTE MECHANISM ④ to the EJECT completed mode.
3) Mount the COMPL CASSETTE MECHANISM ④ onto the mechanism chassis, aligning it with the protuberance.
   Match positions of the FRONT LOADING GEAR △ mark ⑦ and the RACK EJECT mark ⑧. (See Fig. A.)
4) Fix to the mechanism chassis with the two screws ②.
5) Fix to the chassis with the screw ①.
6) Connect to the various connectors.

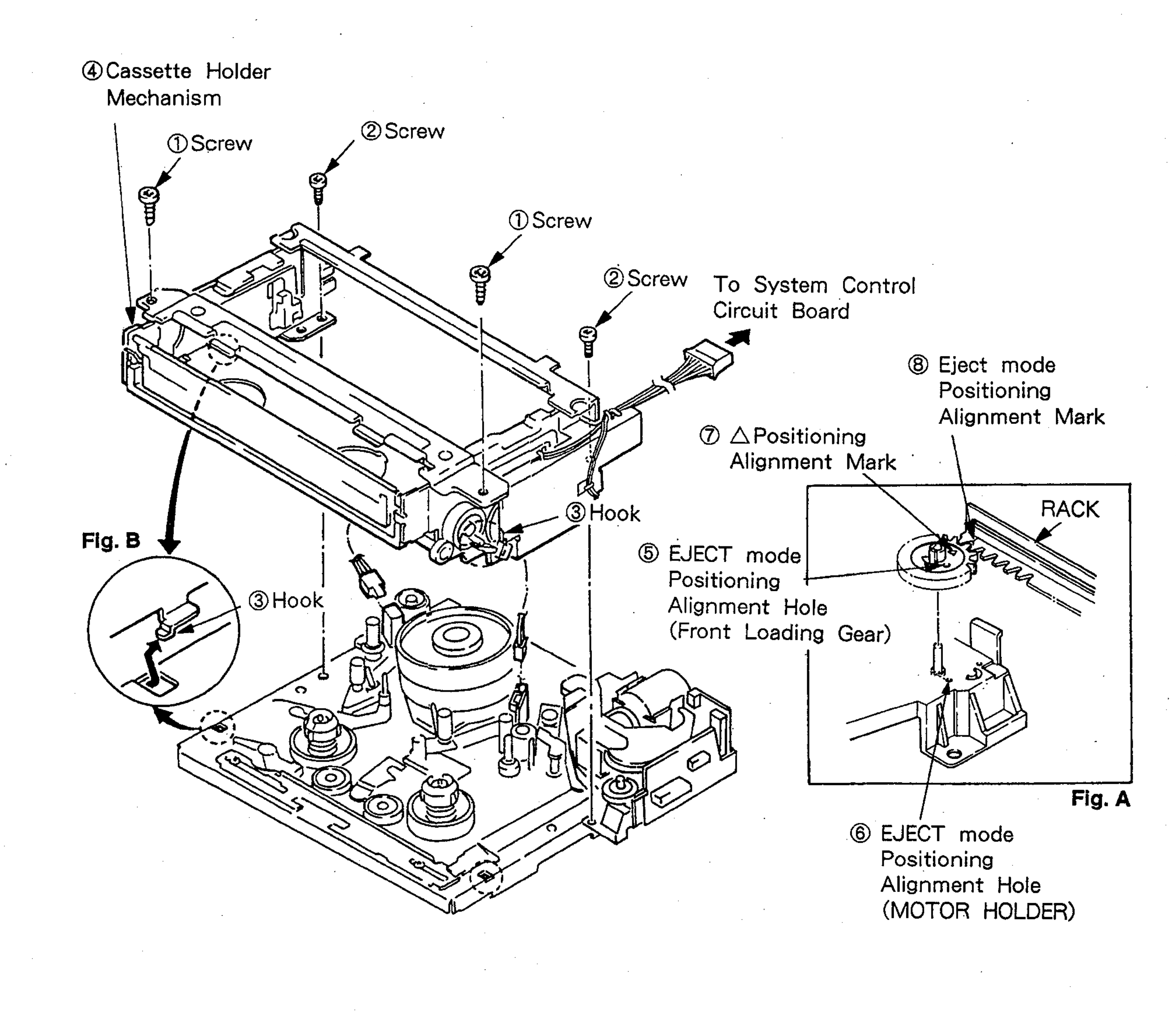

④Cassette Holder Mechanism
①Screw
②Screw
①Screw
②Screw
To System Control Circuit Board
⑧ Eject mode Positioning Alignment Mark
⑦ △Positioning Alignment Mark
RACK
③Hook
Fig. B
③Hook
⑤ EJECT mode Positioning Alignment Hole (Front Loading Gear)
Fig. A
⑥ EJECT mode Positioning Alignment Hole (MOTOR HOLDER)

Fig. 5-2-1 Compl Cassette Mechanism

5-2-2. Gear Bracket Ass'y (See Fig. 5-2-2.)

1. Removal

1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
2) Remove the four screws ①, then remove the GEAR BRACKET ASS'Y ②.
3) Remove the E ring ③, then remove the LOCK GEAR ④, the PINION LEVER ASS'Y ⑤, the PINION GEAR ⑥ and the RACK ⑦, in that order.

2. Remounting

1) Apply grease to the shaft ⑧ and the two pins ⑨ of the GEAR BRACKET ASS'Y.
2) Apply grease to the pin ⑩ of the PINION LEVER ASS'Y.
3) Apply grease to the toothed part of the RACK ⑦.
4) Fit the RACK ⑦ onto the two pins ⑨. Match position of the hole ⑪ to the GEAR BRACKET hole ⑫.
5) Mount the PINION GEAR ⑥, PINION LEVER ASS'Y ⑤, and LOCK GEAR ④ in the shaft ⑧ in the order mentioned.
   Set the hole ⑬ of the PINION GEAR and the LOCK GEAR with the hole ⑪ of the RACK for proper positioning at that time.
6) Mount them in E-ring shaft.
7) Set the GEAR BRACKET ASS'Y ② to the dowel and mount it using four screws ①.
   Set the hole Ⓐ of the IDLER GEAR with the hole Ⓑ of the SIDE BOARD as shown in Fig. 5-2-3 at this time.
   Also set the hole ⑬ of the PINION GEAR and the LOCK GEAR with the hole ⑫ of the GEAR BRACKET by referring to Fig. 5-2-2. After mounting them, check to be sure that FL START SWITCH ⑭ is in the ON state shown in Fig. A.
8) Remount the COMPL CASSETTE MECHANISM as instructed in 5-2-1.

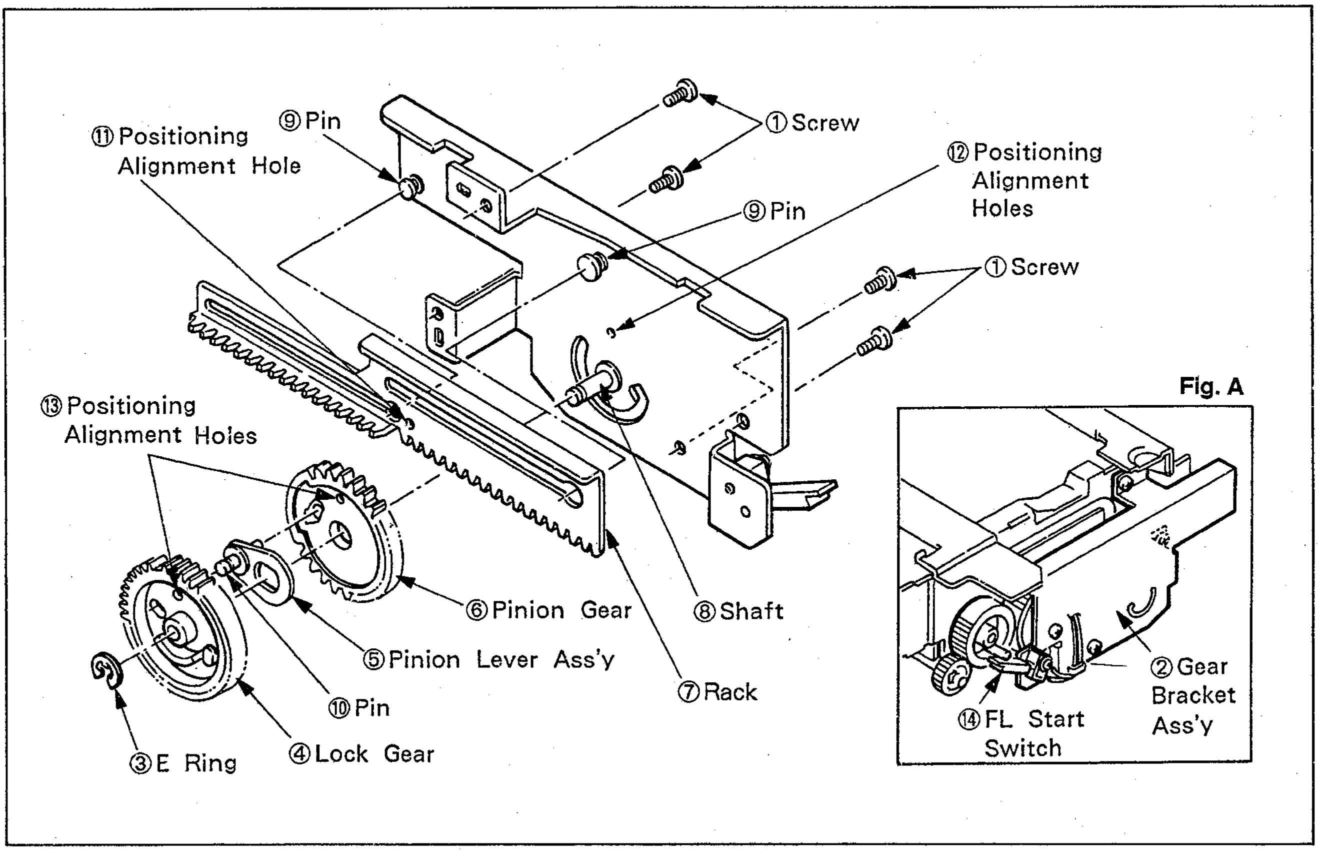

⑪ Positioning Alignment Hole
⑨ Pin
① Screw
⑫ Positioning Alignment Holes
⑨ Pin
① Screw
⑬ Positioning Alignment Holes
⑥ Pinion Gear
⑧ Shaft
⑤ Pinion Lever Ass'y
⑦ Rack
⑩ Pin
③ E Ring
④ Lock Gear
Fig. A
② Gear Bracket Ass'y
⑭ FL Start Switch

Fig. 5-2-2. Gear Bracket Ass'y

5-2-3. Cassette Drive Gear (Right) (See Fig. 5-2-3.)

1. Removal

1) Remove the COMPL CASSETTE MECHANISM and the GEAR BRACKET ASS'Y as instructed in 5-2-1. and 5-2-2., respectively.
2) Remove the IDLER GEAR ①.
3) Remove the SPRING COIL ②, then remove the MAIN GEAR ③.
4) Remove the E ring ④, then remove the LEVER GEAR ASS'Y R ⑤.
5) Open the hook ⑥ and remove the COUPLE GEAR R ⑦. Take care not to open the hook ⑥ too much, otherwise it may get deformed or broken. If it does, replace it.
6) Remove the IDLER GEAR R ⑧.

2. Remounting

1) Apply grease to gear parts that undergo friction.
2) Mount the IDLER GEAR R ⑧ onto the axle ⑨.
3) Mount the COUPLE GEAR R ⑦ onto the ROD ASS'Y axle ⑩. When doing so, match the couple gear position with the IDLER GEAR R ⑧ as shown in Fig. A.
4) Mount the LEVER GEAR ASS'Y R ⑤ onto the axles ⑪ and ⑫. Match position to the IDLER GEAR R ⑧ as shown in Fig. A.
5) Mount the E ring ④ onto the axle ⑫.
6) Mount the MAIN GEAR ③ onto the axle ⑪. When doing so, match position to the IDLER GEAR R ⑧ as shown in Fig. A.
7) Hook the SPRING COIL ② to the notch ⑬ in the MAIN GEAR R ③ and the LEVER GEAR ASS'Y R.
8) Mount the IDLER GEAR ① onto the axle ⑭. When doing so, match position to the MAIN GEAR as shown in Fig. A.
9) Mount the GEAR BRACKET ASS'Y and the COMPL CASSETTE MECHANISM ASS'Y as instructed in 5-2-2. and 5-2-1., respectively.

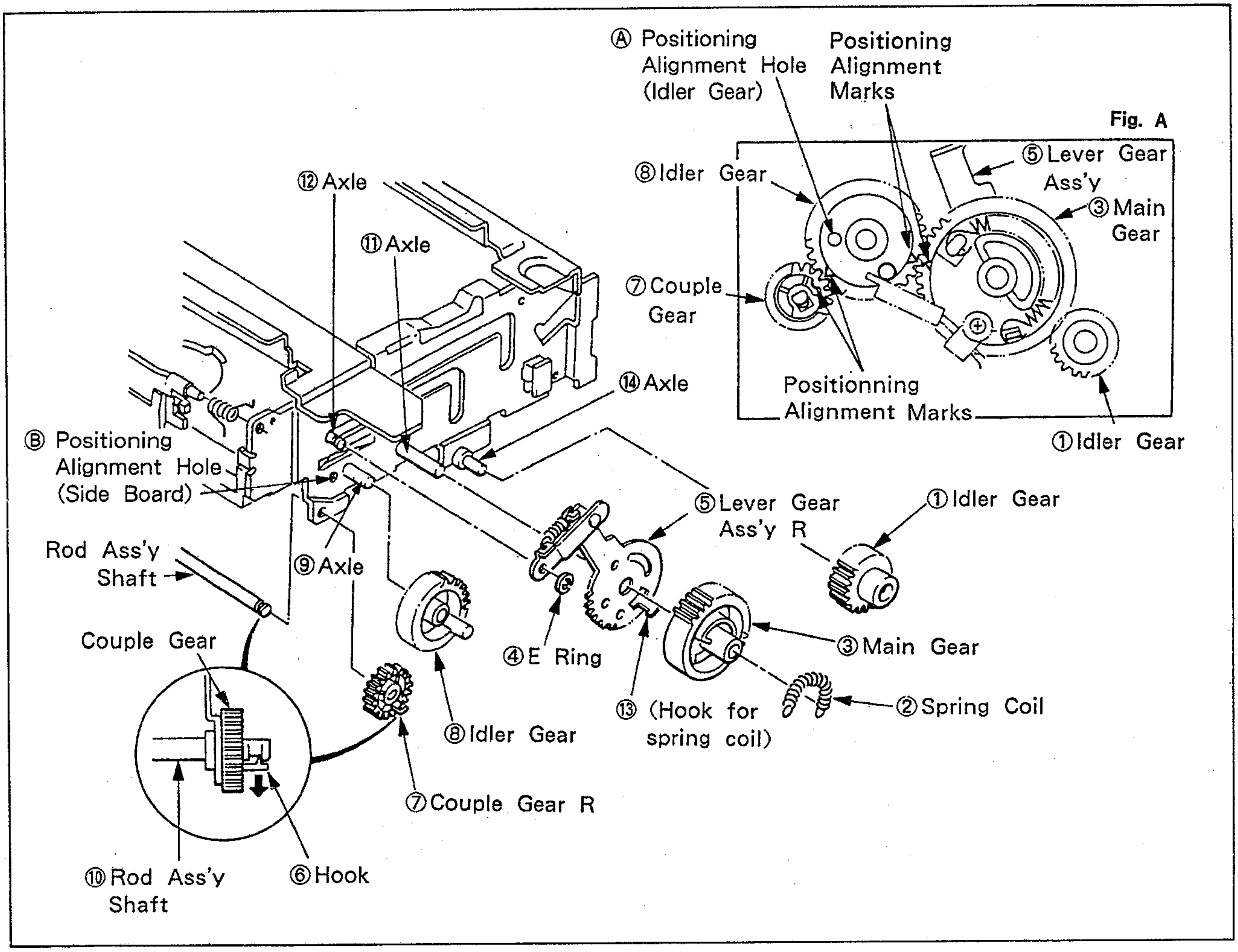

Ⓐ Positioning Alignment Hole (Idler Gear)
Positioning Alignment Marks
Fig. A
⑧Idler Gear
⑤Lever Gear Ass'y
③Main Gear
⑦Couple Gear
⑭Axle
Positionning Alignment Marks
①Idler Gear
⑫Axle
⑪Axle
Ⓑ Positioning Alignment Hole (Side Board)
Rod Ass'y Shaft
⑨Axle
Couple Gear
⑤Lever Gear Ass'y R
①Idler Gear
④E Ring
③Main Gear
⑬ (Hook for spring coil)
②Spring Coil
⑧Idler Gear
⑦Couple Gear R
⑩Rod Ass'y Shaft
⑥Hook

Fig. 5-2-3. Cassette Drive Gears (Right Side)

5-2-4. Cassette Drive Gear (Left) (See Fig. 5-2-4)

1. Removal

1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
2) Remove the COUPLE GEAR R as instructed in 5-2-3.
3) Remove the ROD ASS'Y ①.
4) Remove the E ring ②.
5) Remove the hook ③, then remove the LEVER GEAR ASS'Y L ④. Take care not to open the hook ③ too much, otherwise it may get deformed or broken. If it does, replace it.
6) Remove the SPRING COIL ⑤ from the LEVER GEAR ASS'Y ④.
7) Remove the IDLER GEAR L ⑥ and the DOOR OPEN LEVER ⑦.

2. Remounting

1) Apply grease to the axles ⑧, ⑨ and ⑩.
2) Apply grease to the IDLER GEAR L ⑥.
3) Mount the DOOR OPEN LEVER ⑦ onto the axle ⑧. Do it so that the end of the DOOR OPEN LEVER ⑦ leans against the front side of the CASSETTE DOOR ⑪ as shown in Fig. A.
4) Mount the IDLER GEAR L ⑥ onto the axle ⑧.
5) Pass the ROD ASS'Y ① through the hole ⑫. Match position of the COUPLE GEAR L ⑬ and the IDLER GEAR L ⑥ as shown in Fig B.
6) Mount the COUPLE GEAR R as instructed in 5-2-3.
7) Hook the SPRING COIL ⑤ to the LEVER GEAR ASS'Y L ④.
8) Mount the LEVER GEAR ASS'Y L ④ onto the axle ⑨ and the shaft ⑩. Match position to the IDLER GEAR L ⑥ as shown in Fig. B.
9) Mount the COMPL CASSETTE MECHANISM onto the chassis as instructed in 5-2-1.

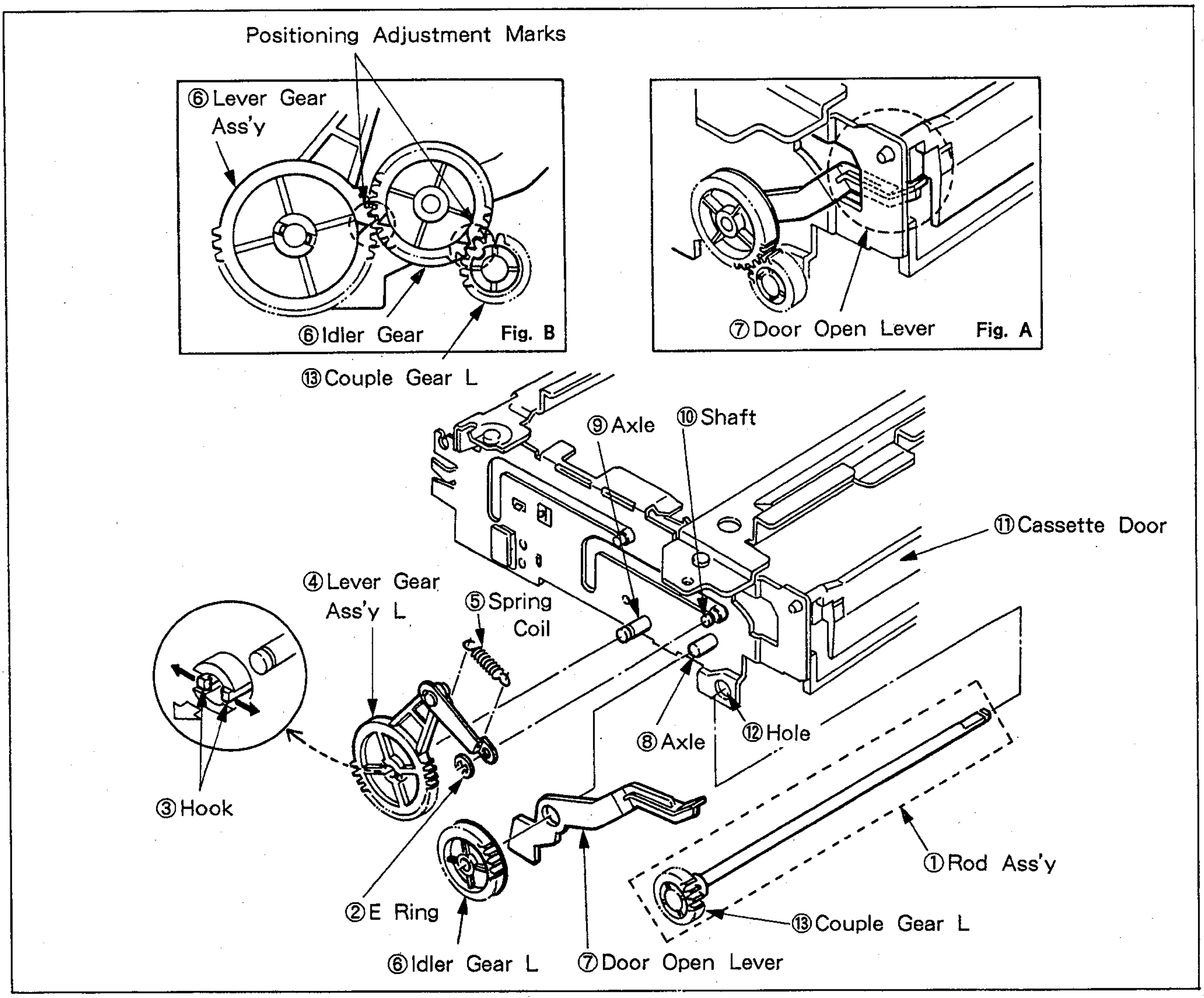

Positioning Adjustment Marks
⑥Lever Gear Ass'y
⑥Idler Gear
Fig. B
⑬Couple Gear L
⑦Door Open Lever
Fig. A
⑨Axle
⑩Shaft
⑪Cassette Door
④Lever Gear Ass'y L
⑤Spring Coil
③Hook
⑧Axle
⑫Hole
①Rod Ass'y
②E Ring
⑬Couple Gear L
⑥Idler Gear L
⑦Door Open Lever

Fig. 5-2-4. Cassette Drive Gears (Left Side)

5-2-5. FL Start Switch (See Fig. 5-2-5.)

1. Removal

1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
2) Remove the screw ①.
3) Remove the lead wire of the FL START SWITCH ②.

2. Remounting

1) Solder the lead wire to the FL START SWITCH ② terminal.
2) Align the FL START SWITCH ② protuberance to the hole ⑤, then mount it onto the GEAR BRACKET ASS'Y ③ with the screw ①. Do it so that the FL START SWITCH ② is turned ON by holding the pin ④ of IDLER GEAR in the EJECT completed mode.
3) Mount the COMPL CASSETTE MECHANISM as instructed in 5-2-1.

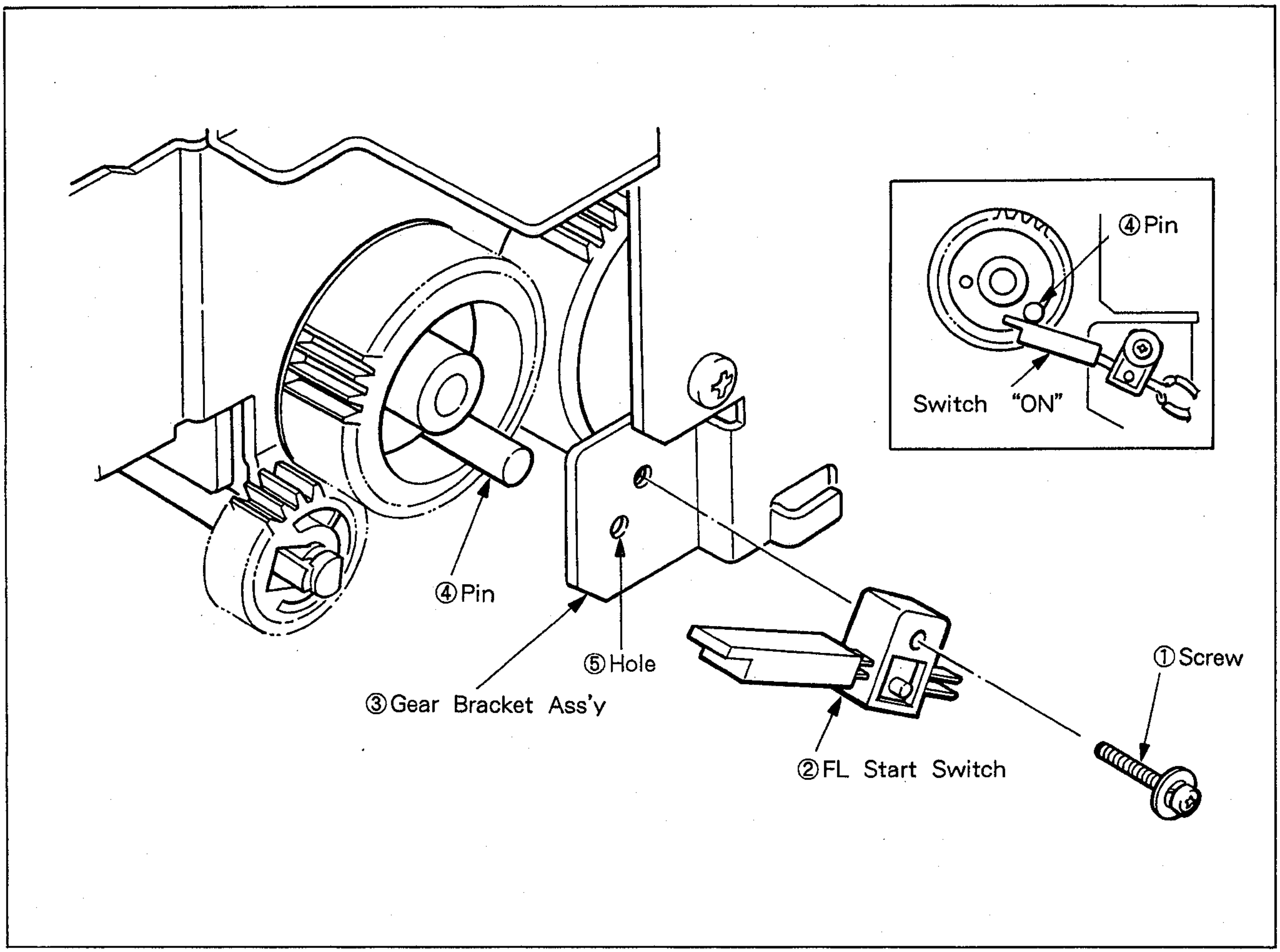

④Pin
Switch "ON"
④Pin
⑤Hole
③Gear Bracket Ass'y
②FL Start Switch
①Screw

Fig. 5-2-5. FL Start Switch

5-2-6. T-Top Sensor, T-End Sensor (See Fig. 5-2-6.)

1. Removal

1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
2) When removing the T-TOP SENSOR, remove the GEAR BRACKET ASS'Y as instructed in 5-2-2.
3) Unhook the hook ① as instructed in Fig. A, then remove the LID ②. Take care not to push the hook ① too much, otherwise it may be deformed or broken.
4) Remove the phototransistors ③, then remove the lead wire.

Note : Mounting position of the transistor holder on the T-END SENSOR side is precisely adjusted at the factory, so do never remove it from the COMPL CASSETTE MECHANISM.

2. Remounting

1) Solder the brown lead wire to the emitter side, and the red lead wire to the collector side of the T-TOP SENSOR phototransistor ③.
   Solder the orange lead wire to the emitter side, and the yellow lead wire to the collector side of the T-END SENSOR phototransistor.
2) Mount the phototransistors ③ onto their respective holders.
3) Mount the LID ② and fix it with the hook ①.
4) Mount the GEAR BRACKET ASS'Y as instructed in 5-2-2.
5) Mount the COMPL CASSETTE MECHANISM as insturcted in 5-2-1.

Do not remove the holder from the compl cassette mechanism.

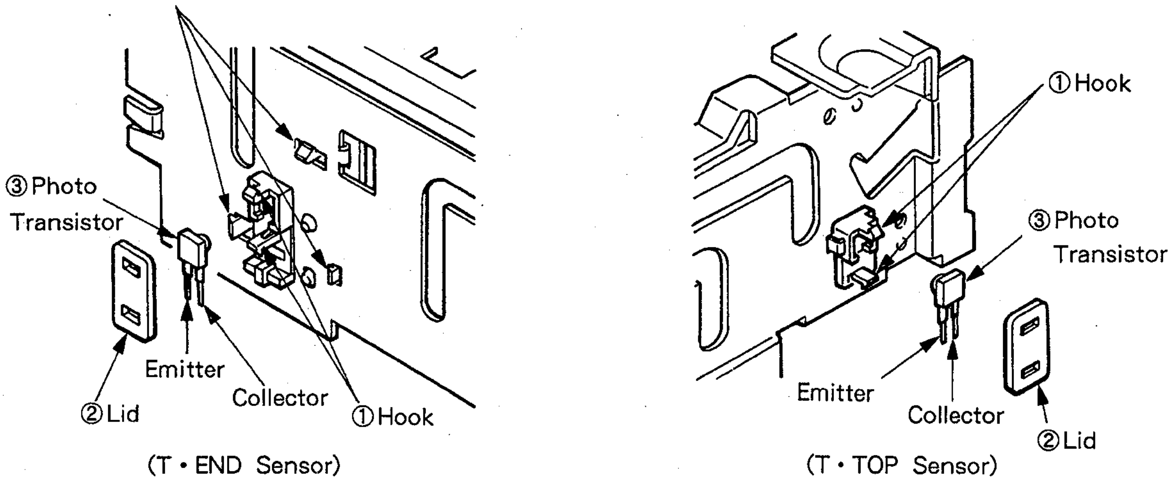

③Photo Transistor
Emitter
Collector
②Lid
①Hook
(T • END Sensor)
①Hook
③Photo Transistor
Emitter
Collector
②Lid
(T • TOP Sensor)

Fig. A

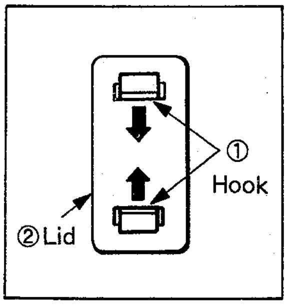


Fig. 5-2-6. T TOP Sensor & T END Sensor

5-3. COMPL HOLDER MOTOR (LOADING MOTOR BLOCK)

5-3-1. COMPL Motor Bracket

1. Removal

1) Remove the PRE-AMP UNIT and the PRE-AMP. BRACKET as instructed in 5-1.
2) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
3) Remove the two screws ① and the other one ⑩, then remove the COMPL HOLDER MOTOR ② (see Fig. 5-3-1.).

2. Remounting

1) Set the mechanism chassis to the INITIAL mode. In this mode, look at the mechanism chassis positioning holes ③ just from above and align the MAIN CAM ④ and MODE CAM ⑤ positioning holes as shown in Fig. A.
2) Set the COMPL HOLDER MOTOR ② to the INITIAIL mode with the mode selector (VHJ-0050). In this position, the FRONT LOADING GEAR △ mark ⑥ is aligned with the MOTOR HOLDER INITIAL mode position mark ⑦ (see Fig. B.).
3) Align the ROTARY SWITCH (mode detector switch) ⑧ with the INITIAL mode position mark ⑨ (see Fig. C.).
4) Align the COMPL HOLDER MOTOR main unit ② with the protuberance ⑪, then mount it with the two screws ① and the other one ⑩.
5) Mount the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
6) Mount the PRE-AMP UNIT and the PRE-AMP. BRACKET as instructed in 5-1.

Note : Normal mechanism operation cannot be achieved if initial positioning of the MAIN CAM ④, the MODE CAM ⑤ and the ROTARY SWITCH (mode detector switch) ⑧ are not performed precisely.

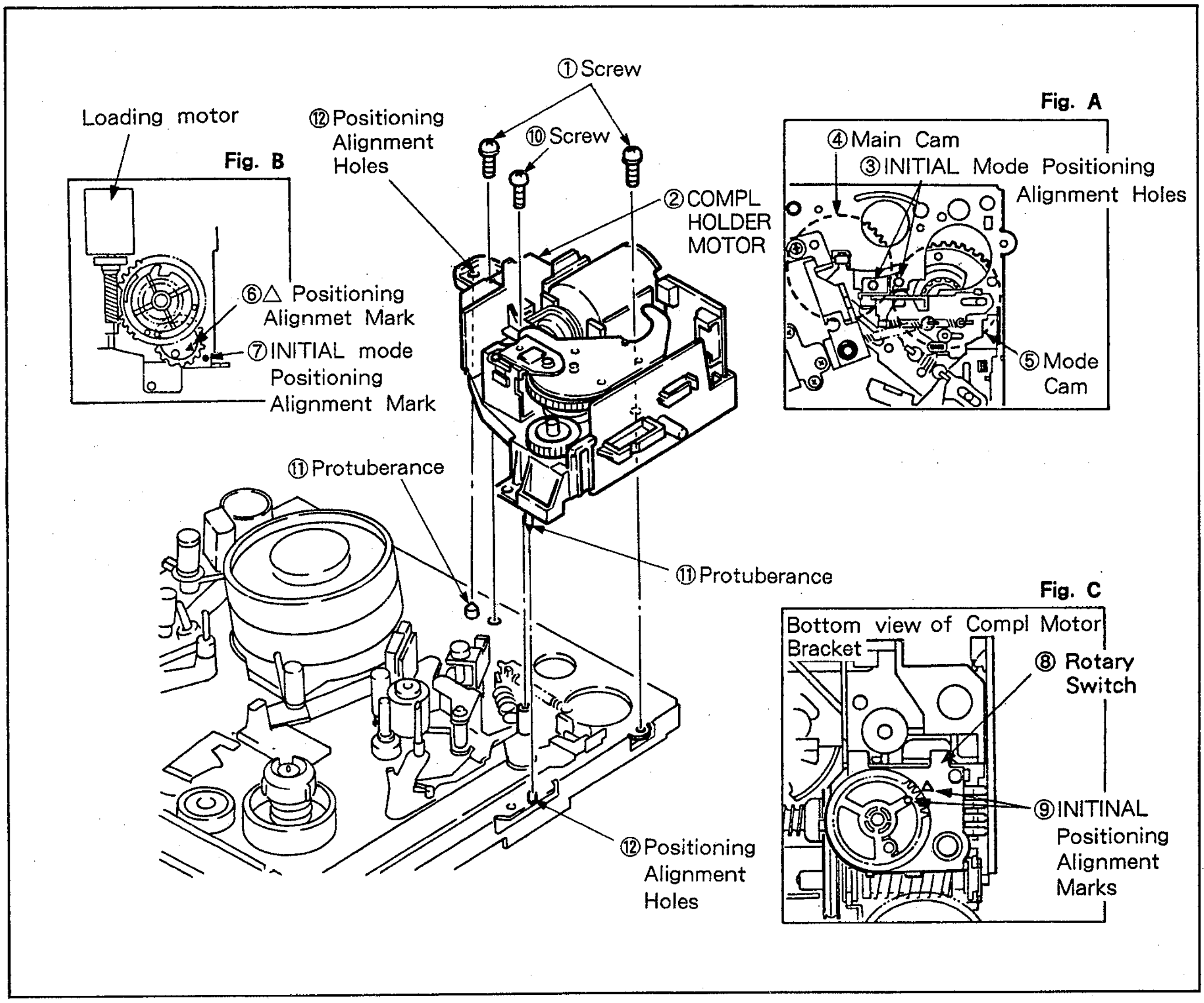

①Screw
Loading motor
Fig. B
⑫Positioning Alignment Holes
⑩Screw
Fig. A
④Main Cam
③INITIAL Mode Positioning Alignment Holes
②COMPL HOLDER MOTOR
⑥△ Positioning Alignmet Mark
⑦INITIAL mode Positioning Alignment Mark
⑤Mode Cam
⑪Protuberance
⑪Protuberance
Fig. C
Bottom view of Compl Motor Bracket
⑧ Rotary Switch
⑨INITINAL Positioning Alignment Marks
⑫Positioning Alignment Holes

Fig. 5-3-1 Compl Holder Motor

5-3-2. Loading Motor (Refer to Fig. 5-3-2.)

1. Removal

LOADING MOTOR can be replaced after LOADING MOTOR BLOCK unit has been removed by referring to 5-3-1. The 1990 version of the mechanism allows LOADING MOTOR itself to be replaced without removing CASSETTE HOLDER BLOCK and LOADING MOTOR BLOCK. The following describes this procedure.

1) Use MODE SELECTOR (VHJ-0050) to set the mechanism to the initial mode.
2) Remove the connector for DEW SENSOR connected to the MC-3 board ①.
3) Remove three screws ② and remove HOLDER BRACKET ④ with FRONT WORM ASS'Y ③ still attached.
4) Remove DAMPER ⑥ attached to the pulley of LOADING MOTOR ⑤.
5) Remove FRONT HELICAL GEAR ⑦ and WASHER ⑧.
6) Remove soldered LEAD WIRE from the terminal of LOADING MOTOR ⑤.
7) Remove LOADING BELT ⑨.
8) Remove LOADING MOTOR ⑤ by lifting up from the back terminal side.

2. Remounting

Before attaching LOADING MOTOR ⑤ to MOTOR BRACKET ASS'Y ⑩, confirm DAMPER ⑪ and DAMPER ⑫ shown in Fig. 5-3-5. are in the proper position on MOTOR BRACKET ASS'Y ⑩.

1) LOADING MOTOR ⑤ puts REAR SIDE BOSS ㉓ in the slit ㉔ of MOTOR HOLDER ⑩.
   Further, mount the tap hole ⑬ at two points of the front pulley side so that the it is secured to the PROTUBERANCE ⑭ of the MOTOR HOLDER at two points.
2) Solder the lead wire from the MC-3 board to LOADING MOTOR ⑤ terminal. (Solder the red lead wire to the positive terminal side.)
3) Hang LOADING BELT ⑨ on the pulley.
4) After hanging BELT ⑨ on the pulley, confirm that the mechanism unit is in the initial mode. The initial mode is indicated by Fig. A of Fig. 5-3-2., and is the position in which INITIAL POSITIONING ALIGNMENT HOLEs of MAIN CAM ⑮ and MODE CAM ⑯ are lined up with THROUGH HOLE ⑰ of MOTOR HOLDER. If the initial mode is not selected, adjust with MODE SELECTOR (VHJ-0050).
5) As shown in Fig. B, confirm the positions of the △ POSITIONING ALIGNMENT MARK on FRONT LOAD GEAR ⑱ and INITIAL MARK ⑲ position of MOTOR HOLDER and the position relationship of CASSETTE HOLDER RACK ⑳.
6) Apply a light coat of grease to the entire sides of AXLE ㉑ and FRONT HELICAL GEAR ⑦.
7) Attach FRONT HELICAL GEAR ⑦ and WASHER ⑧ to AXLE ㉑. As shown in Fig. C, FRONT HELICAL GEAR ⑦ is attached so that the indent on the side is inside PIN ㉒ of FRONT LEVER ASS'Y.
8) Attach DAMPER ⑥ to LOADING MOTOR ⑤ pulley.
9) HOLDER BRACKET ④ is attached by engaging FRONT WORM ASS'Y ③ with LOADING MOTOR ⑤ pulley, and held in place with three screws ②.
10) Attach the connector of DEW SENSOR ㉕ to the MC-3 board ① and return the mechanism to the eject completion using MODE SELECTOR.

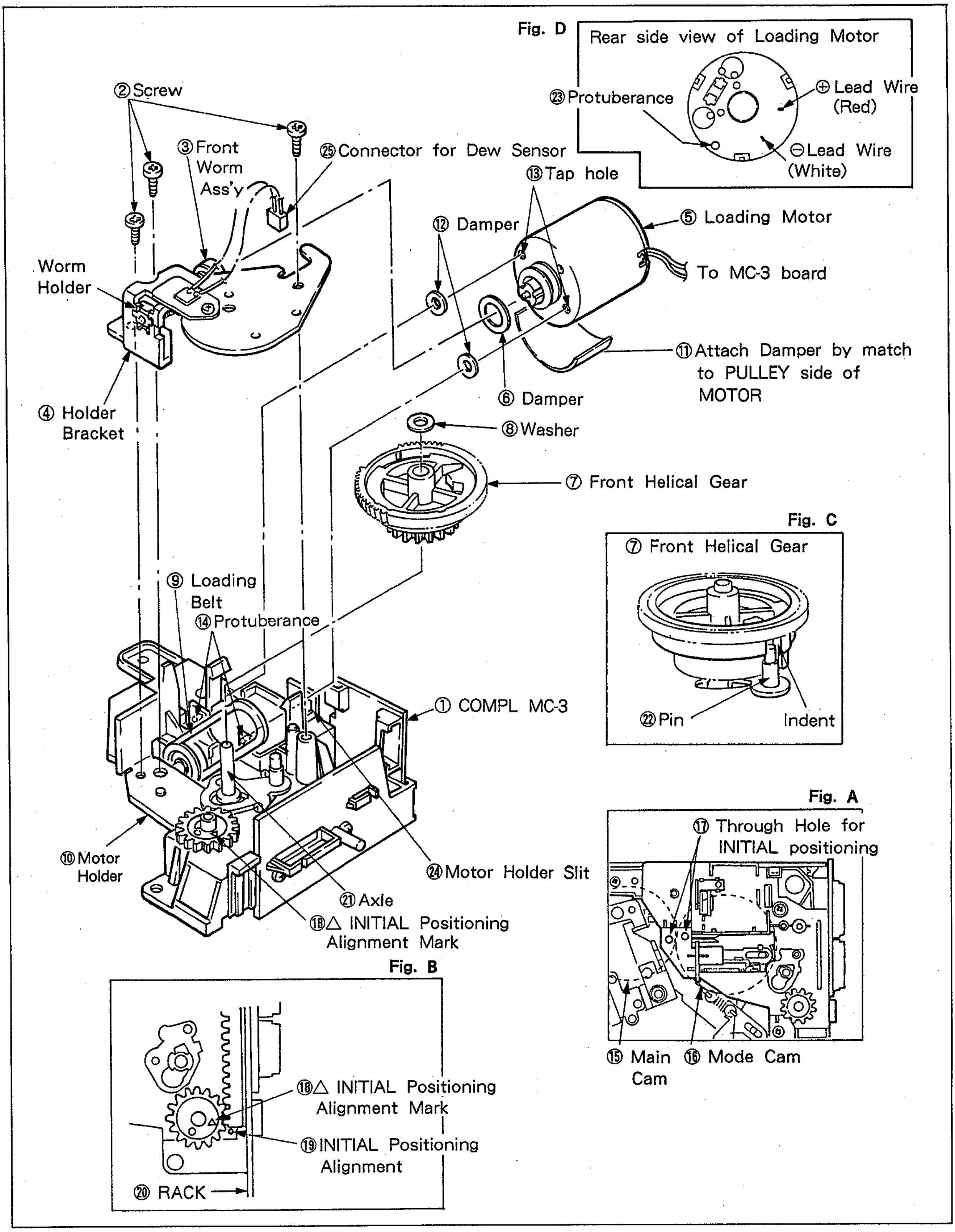


Fig. D
Rear side view of Loading Motor
㉓ Protuberance
⊕ Lead Wire (Red)
⊖ Lead Wire (White)
② Screw
③ Front Worm Ass'y
㉕ Connector for Dew Sensor
⑬ Tap hole
⑫ Damper
⑤ Loading Motor
To MC-3 board
Worm Holder
⑪ Attach Damper by match to PULLEY side of MOTOR
④ Holder Bracket
⑥ Damper
⑧ Washer
⑦ Front Helical Gear
Fig. C
⑦ Front Helical Gear
⑨ Loading Belt
⑭ Protuberance
① COMPL MC-3
㉒ Pin
Indent
Fig. A
⑰ Through Hole for INITIAL positioning
⑩ Motor Holder
㉔ Motor Holder Slit
㉑ Axle
⑱△ INITIAL Positioning Alignment Mark
Fig. B
⑮ Main Cam
⑯ Mode Cam
⑱△ INITIAL Positioning Alignment Mark
⑲ INITIAL Positioning Alignment
⑳ RACK

Fig. 5-3-2. Loading Motor

5-4. TAPE LOADING MECHANISM

5-4-1. Main Parts of the Tape Loading Mechanism (See Fig. 5-4-1.)

1. Removal

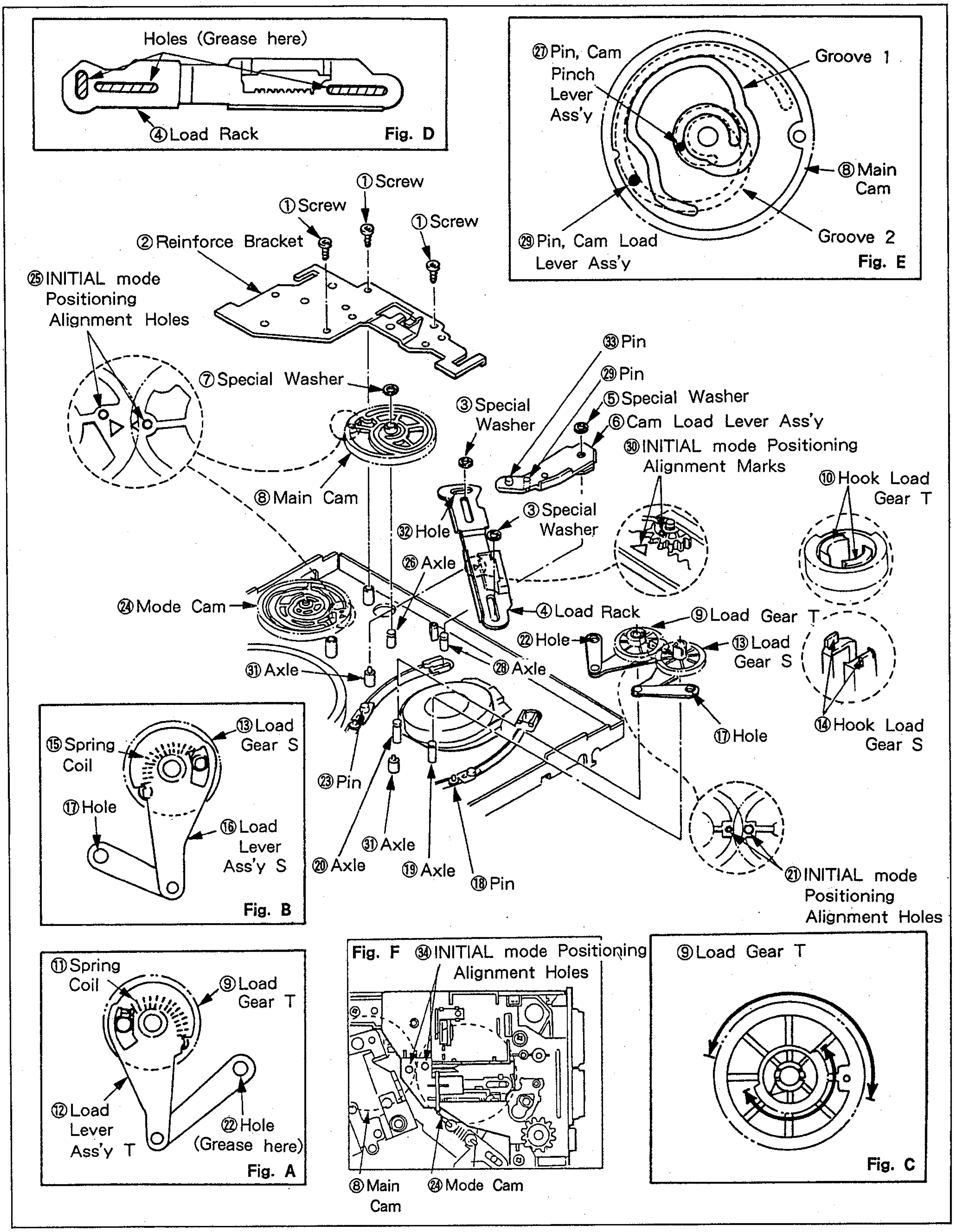
1) Remove connectors from the DRUM MOTOR board (SV-5).
2) Remove the three screws ①, then remove the REINFORCE BRACKET ②.
3) Remove the two special washers ③, then remove the LOAD RACK ④.
4) Remove the special washer ⑤, then remove the CAM LOAD LEVER ASS'Y ⑥.
5) Remove the stop washer ⑦, then remove the MAIN CAM ⑧.
6) Unhook the LOAD GEAR T hook ⑩, then remove the LOAD GEAR T ⑨ as shown in Fig. A, with the SPRING COIL ⑪ and the LOAD LEVER ASS'Y T ⑫ attached to it.
7) Unhook the LOAD GEAR S hook ⑭, then remove the LOAD GEAR S ⑬ as shown in Fig. B, with the SPRING COIL S ⑮ and the LOAD LEVER ASS'Y S ⑯ attached to it.

Note : Take care not to open the LOAD GEAR hooks too much, otherwise they may be deformed or broken. If they are, replace them.

2. Remounting

1) Apply grease to the inner surface of the LOAD LEVER ASS'Y S ⑯ hole ⑰, as shown in Fig. B.
2) Apply grease to the inner surface of the LOAD LEVER ASS'Y T ⑫ hole ㉒ and to the section of the LOAD GEAR T ⑨ indicated with an arrow in Fig. C.
3) Apply grease to GROOVEs 1 and 2 of the MAIN CAM ⑧, and to the outer side of the teeth.
4) Apply grease to the three oval holes of the LOAD RACK ④ as shown in Fig. D.
5) Apply grease to the outer surface of axles ⑲ ⑳㉖ and ㉘.
6) After assembling as shown in Fig. B, mount the LOAD GEAR S ⑬ onto the axle ⑲. Insert the ROLLER BASE S pin ⑱ into the LOAD LEVER ASS'Y S hole ⑰.
7) After assembling as shown in Fig. A, mount the LOAD GEAR T ⑨ onto the axle ⑳. When doing so, set the LOAD GEAR S ⑬ and the LOAD GEAR T ⑨ to the INITIAL mode position ㉑. Insert the ROLLER BASE T pin ㉓ into the hole ㉒ of the LOAD LEVER ASS'Y T ⑫.
8) Mount the MAIN CAM ⑧ on the axle ㉖. At that time, make sure that the positioning hole ㉕ of the MAIN CAM ⑧ and the MODE CAM ㉔ matches the initial positioning hole ㉞ of the MECHANISM CHASSIS. Also check to be sure that the Pin ㉗ of the CAM PINCH LEVER ASSEMBLY is put in the groove ① of the MAIN CAM as shown in Fig. E.
9) Mount the special washer ⑦ to the axle ㉖.
10) Mount the CAM LOAD LEVER ASS'Y ⑥ onto the axle ㉘. Insert the pin ㉙ into the MAIN CAM GROOVE 2 as shown in Fig. E.
11) Mount the special washer ⑤ onto the axle ㉘.
12) Set the LOAD RACK ④ to the INITIAL mode position ㉚ with the LOAD GEAR T ⑨, and mount onto the two axles ㉛. Insert the CAM LOAD LEVER ASS'Y pin ㉝ into the hole ㉜.
13) Mount the two special washers ③ onto the two axles ㉛.
14) Mount the REINFORCE BRACKET ② with the three screws ①.
15) Insert the connector into the DRUM MOTOR board (SV-5).
16) Confirm that loading and unloading are performed smoothly.

Note : Be sure to perform INITIAL mode positioning of cams and gears precisely.


Holes (Grease here)
④Load Rack
Fig. D
㉗Pin, Cam Pinch Lever Ass'y
Groove 1
⑧Main Cam
Groove 2
㉙Pin, Cam Load Lever Ass'y
Fig. E
①Screw
①Screw
①Screw
②Reinforce Bracket
㉕INITIAL mode Positioning Alignment Holes
⑦Special Washer
⑧Main Cam
③Special Washer
㉝Pin
㉙Pin
⑤Special Washer
⑥Cam Load Lever Ass'y
㉚INITIAL mode Positioning Alignment Marks
⑩Hook Load Gear T
③Special Washer
㉜Hole
㉖Axle
④Load Rack
㉔Mode Cam
㉒Hole
⑨Load Gear T
⑬Load Gear S
㉛Axle
㉘Axle
⑰Hole
⑭Hook Load Gear S
⑮Spring Coil
⑬Load Gear S
⑰Hole
⑯Load Lever Ass'y S
Fig. B
㉓Pin
㉛Axle
⑳Axle
⑲Axle
⑱Pin
㉑INITIAL mode Positioning Alignment Holes
⑪Spring Coil
⑨Load Gear T
⑫Load Lever Ass'y T
㉒Hole (Grease here)
Fig. A
Fig. F
㉞INITIAL mode Positioning Alignment Holes
⑧Main Cam
㉔Mode Cam
⑨Load Gear T
Fig. C

5-4-1. Loading Mechanism Main Parts

5-4-2. Mode Cam (See Fig. 5-4-2.)

1. Removal

1) Set the INITIAL mode with the mode selector (VHJ-0050).
2) Remove the REINFORCE BRACKET as instructed in 5-4-1.
3) Remove the two stop washers ①, then remove the CAM PLATE SLIDE ASS'Y ②.
4) Remove the MODE CAM ③.

2. Remounting

1) Referring to 5-4-1., confirm that the MAIN CAM is in the INITIAL mode position.
2) In case the MAIN CAM is misplaced, use the mode selector (VHJ-0050) to align the MAIN CAM positioning hole with the chassis INITIAL mode position hole (refer to 5-4-1. for the INITIAL mode position). Since the ROTARY SWITCH (mode detector switch) does not rotate, the mode selector indicator lamp will not show the correct mode.
3) Align the ROTARY SWITCH (mode detector switch) ④ with the INITIAL mode position mark ⑤ as shown in Fig. A.
4) Mount the MODE CAM ③ onto the axle ⑥. Do it so that the SLIDE CAM ASS'Y pin ⑪ is placed in the GROOVE 3 as shown in Fig. B.
5) Mount the CAM PLATE SLIDE ASS'Y ② onto the axles ⑥ and ⑦. Do it so that the pin ⑧ gets into the GROOVE 4 of the MODE CAM as shown in Fig. B, and the point ⑨ of the bent-up part into the ACT PLATE SLIDE ASS'Y hole ⑩.
6) Mount the two special washers ① onto the axles ⑥ and ⑦.
7) Mount the REINFORCE BRACKET as instructed in 5-4-1.

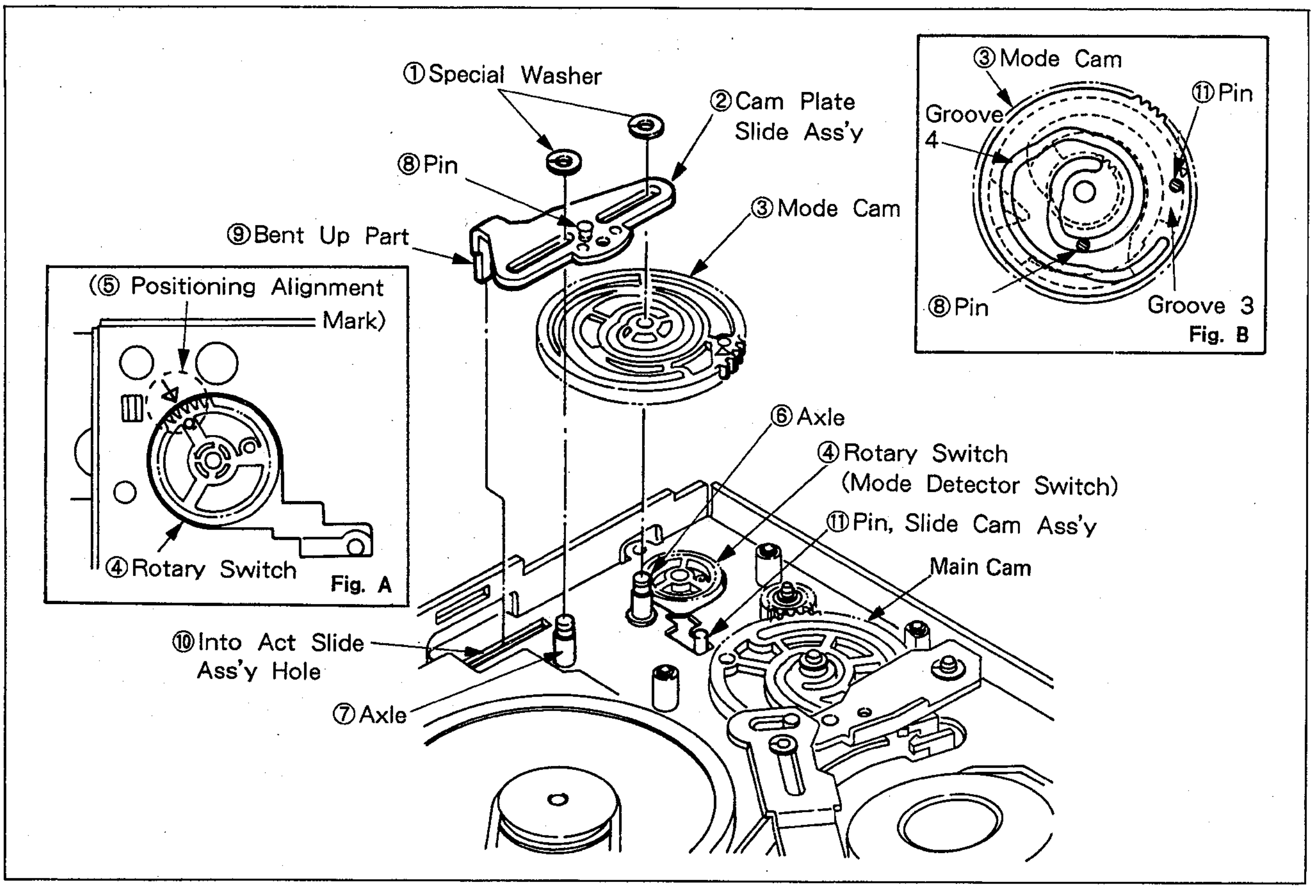

①Special Washer
②Cam Plate Slide Ass'y
⑧Pin
③Mode Cam
⑨Bent Up Part
(⑤ Positioning Alignment Mark)
④Rotary Switch
Fig. A
⑩Into Act Slide Ass'y Hole
⑦Axle
③Mode Cam
Groove 4
⑪Pin
⑧Pin
Groove 3
Fig. B
⑥Axle
④Rotary Switch (Mode Detector Switch)
⑪Pin, Slide Cam Ass'y
Main Cam

Fig. 5-4-2. Mode Cam

5-5. COMPL HEAD BRACKET (ACE HEAD) (See Fig. 5-5-1.)

1. Removal

1) Remove the COMPL HEAD BRACKET special mounting nut ②.
2) Remove the SLEEVE ③, the COMPL HEAD BRACKET ① and the ACE HEAD SPRING COIL ④, in that order.

Note : Take care not to scratch or soil the ACE head surface.

2. Remounting

1) Apply grease to the axle ⑥ as shown in Fig. A.
2) Apply grease to the spot where the COMPL HEAD BRACKET ① makes contact with the STOPPER ⑦ (See Fig. A).
3) Mount the ACE HEAD SPRING COIL ④ and the COMPL HEAD BRACKET ①, in that order, onto the axle ⑥. Hook one end of the ACE HEAD SPRING COIL ④ to the notch ⑤, and the other end to the COMPL HEAD BRACKET, so that the COMPL HEAD BRACKET is pressed against the STOPPER ⑦ (See Fig. A).
4) Mount the SPECIAL NUT ② onto the axle ⑥ through the SLEEVE ③.
5) Clean the ACE head surface with a chamois leather moistened with methyl alcohol.
6) Perform ACE head adjustment as instructed in 6-4.

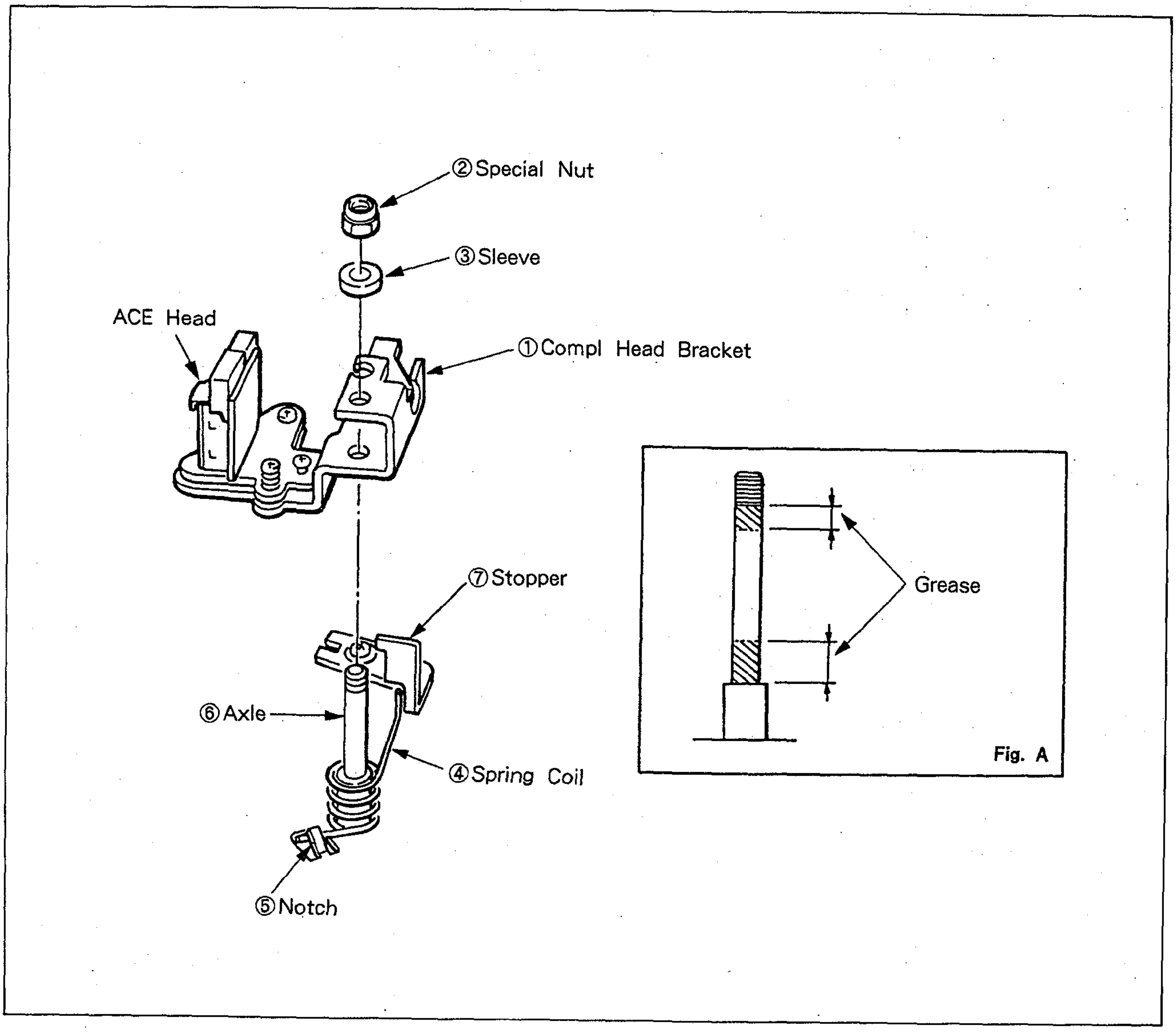

②Special Nut
③Sleeve
ACE Head
①Compl Head Bracket
⑦Stopper
⑥Axle
④Spring Coil
⑤Notch
Grease
Fig. A

Fig. 5-5-1. Compl Head Bracket (ACE Head)

5-6. PINCH ROLLER PRESSURE MECHANISM (See Fig. 5-6-1.)

1. Removal

1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
2) Remove the COMPL HEAD BRACKET as instructed in 5-5.
3) Remove the PINCH SPRING COIL ①.
4) Remove the special washer ②, then remove the PINCH LEVER ASS'Y ③.
5) Remove the REV GUIDE LEVER SPRING COIL ④.
6) Remove the REV GUIDE LEVER ASS'Y ⑥ from the hook ⑤ of the plastic molding bearing on the bottom side. Use a jig VHJ-0073 shown in Fig. 5-6-2 to widen the hook ⑤ of the plastic molding bearing. By so doing, the above removal of the REV GUIDE LEVER ASS'Y ⑥ can be made more easily. Care should be taken to avoid pushing the jig VHJ-0073 too much. Pushing it too hard may damage the hook in an extreme case.
7) Remove the LINK LOCK SPRING COIL ⑦.
8) Remove the special washer ⑧, then remove the PINCH CAM LEVER ASS'Y ⑨.
9) Remove the ACT PINCH SLIDE ASS'Y ⑩.

Note : If damaged the claw ⑤ of the plastic bearing, reference should be made to Section 3. "Method of Repairing the Bearing Section of REV GUIDE LEVER ASSEMBLY".

2. Remounting

1) Apply grease to pins ⑫/⑬ and axles ⑯/⑱.
2) Apply grease to the ACT PINCH SLIDE ASS'Y pin ⑰.
3) Set the INITIAL mode with the mode selector (VHJ-0050).
4) Mount the ACT PINCH SLIDE ASS'Y ⑩ onto pins ⑫ and ⑬.
5) Insert the pin ⑭ of the PINCH CAM LEVER ASS'Y ⑨ into the MAIN CAM ⑪ GROOVE 1, and mount onto the axle ⑯ while inserting the pin ⑰ of the ACT PINCH SLIDE ASS'Y into the hole ⑮.
6) Mount the special washer ⑧ onto the axle ⑯.
7) Hook the LINK LOCK SPRING COIL ⑦ to the PINCH CAM LEVER ASS'Y ⑨.
8) Mount the REV GUIDE LEVER ASS'Y ⑥ to the plastic molding bearing, then fix it with the hook ⑤ at the bottom.
9) Hook the REV GUIDE LEVER SPRING COIL ④.
10) Mount the PINCH LEVER ASS'Y ③ to the axle ⑱.
11) Mount the special washer ② to the axle ⑱.
12) Hook the PINCH SPRING COIL ① between the ACT PINCH SLIDE ASS'Y ⑩ and the PINCH LEVER ASS'Y ③.
13) Mount the COMPL HEAD BRACKET as instructed in 5-5.
14) Mount the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
15) Perform ACE head adjustment as instructed in 6-4.

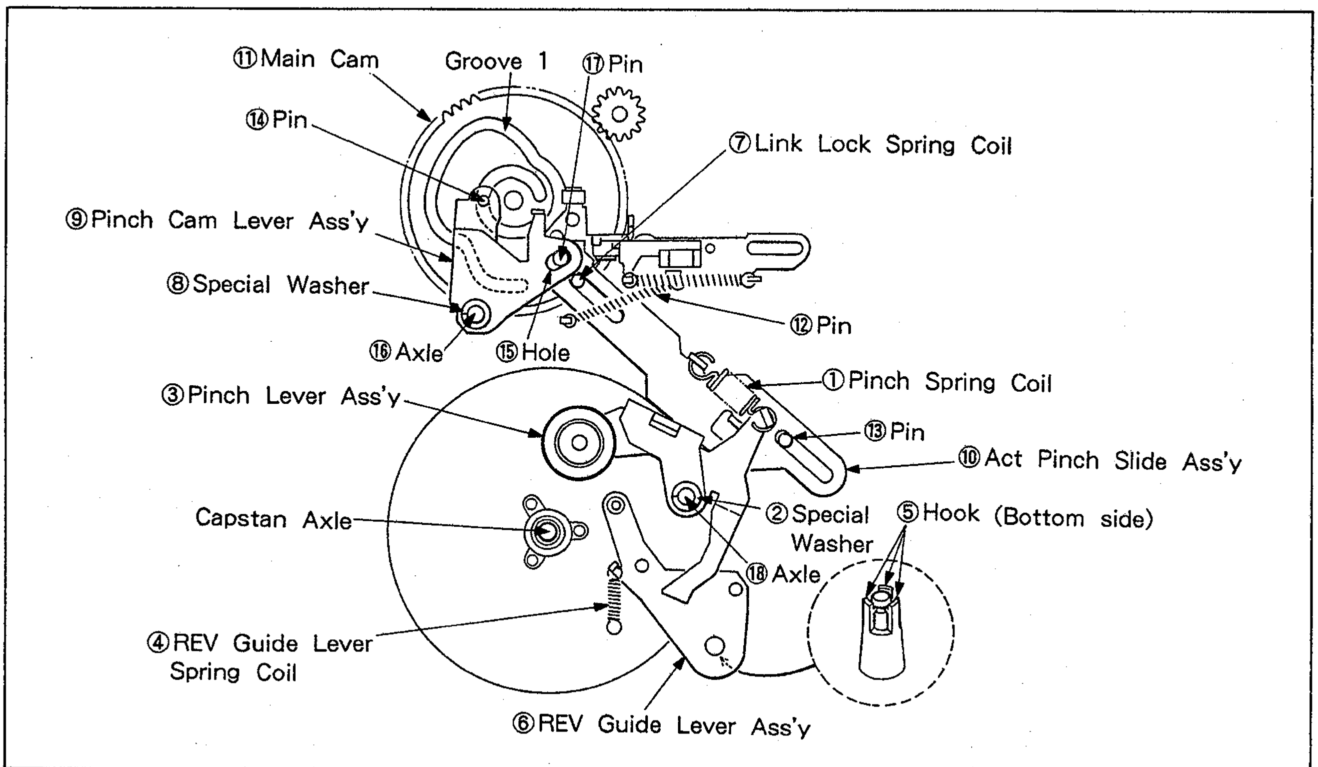
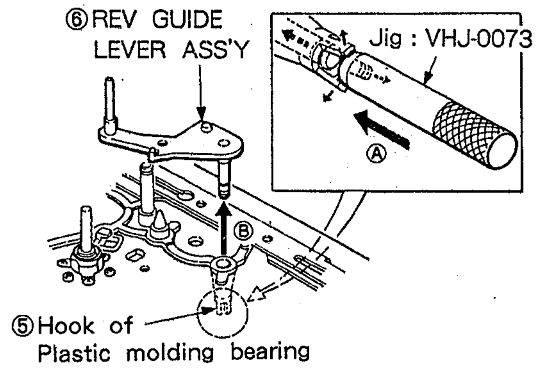

⑪Main Cam
Groove 1
⑰Pin
⑭Pin
⑦Link Lock Spring Coil
⑨Pinch Cam Lever Ass'y
⑧Special Washer
⑫Pin
⑯Axle
⑮Hole
①Pinch Spring Coil
③Pinch Lever Ass'y
⑬Pin
⑩Act Pinch Slide Ass'y
Capstan Axle
②Special Washer
⑤Hook (Bottom side)
⑱Axle
④REV Guide Lever Spring Coil
⑥REV Guide Lever Ass'y

Fig. 5-6-1. Pinch Roller Pressing Mechanism


⑥REV GUIDE LEVER ASS'Y
Jig : VHJ-0073
Ⓐ
Ⓑ
⑤Hook of Plastic molding bearing

Remove REV GUIDE LEVER ASS'Y in the direction of arrow Ⓑ, pushing VHJ-0073 slightly in the direction of arrow Ⓐ.
Be careful not to damage the hook by pushing too much.

Fig. 5-6-2 Method of Using the Jig VHJ-0073

3. Method of Repairing the Bearing Section of REV GUIDE LEVER ASSEMBLY

If the hook of the plastic molding bearing is damaged in the process of removing the REV GUIDE LEVER ASS'Y, proceed with the repair as follows:

1) Scrape the broken hook of the bearing section with a cutter knife and flatten it.
2) Insert the REV GUIDE LEVER ASS'Y in the bearing and fit a stopper washer in. The special washer to be used must be Part No. 411 109 1605. This stop washer (Part No. 411 109 1605) is the same as that used on SUPPLY REEL ASS'Y or TAKE-UP REEL ASS'Y.
   Remove the REV GUIDE LEVER ASSEMBLY toward an arrow B while pushing the jig VHJ-0073 lightly in the direction of an arrow.

Pushing the jig VHJ-0073 too much may cause hook breakage. Therefore, care should be taken.

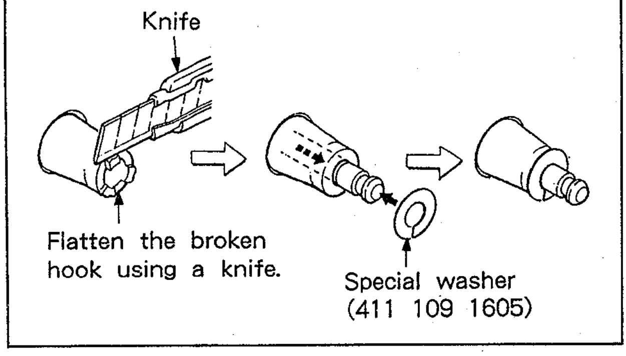

Knife
Flatten the broken hook using a knife.
Special washer (411 109 1605)

Fig. 5-6-3 Method of Repairing the Bearlnig Section of the REV GUIDE LEVER ASSEMBLYE

5-7. BRAKE MECHANISM

5-7-1. Sub Take-up Brake Ass'y (See Fig. 5-7-1.)

1. Removal

1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
2) Remove the SPRING COIL ①.
3) While pushing the hook ② in the direction of arrow, remove the SUB TAKE-UP BRAKE ASS'Y ③.

2. Remounting

1) Mount the SUB TAKE-UP BRAKE ASS'Y ③ onto the pin ④. Confirm that the hook ② is firmly hooked to the chassis.
2) Fit the SPRING COIL between hooks ⑤ and ⑥.
3) Mount the COMPL CASSETTE MECHANISM as instructed in 5-2-1.

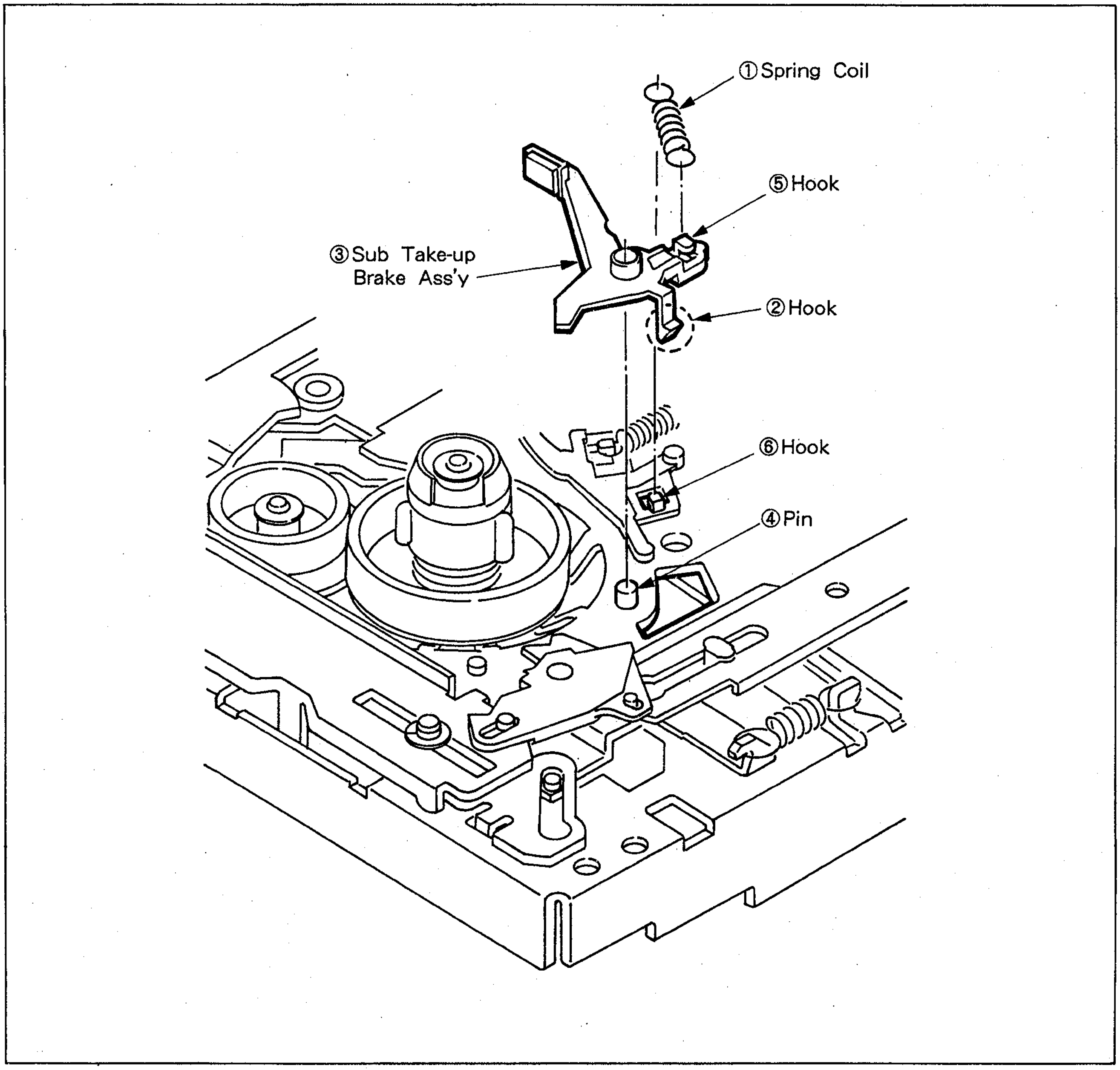

①Spring Coil
⑤Hook
③Sub Take-up Brake Ass'y
②Hook
⑥Hook
④Pin

Fig. 5-7-1. Sub Take-up Brake Ass'y

5-7-2. Supply Brake Ass'y and Take-up Brake Ass'y (See Fig. 5-7-2.)

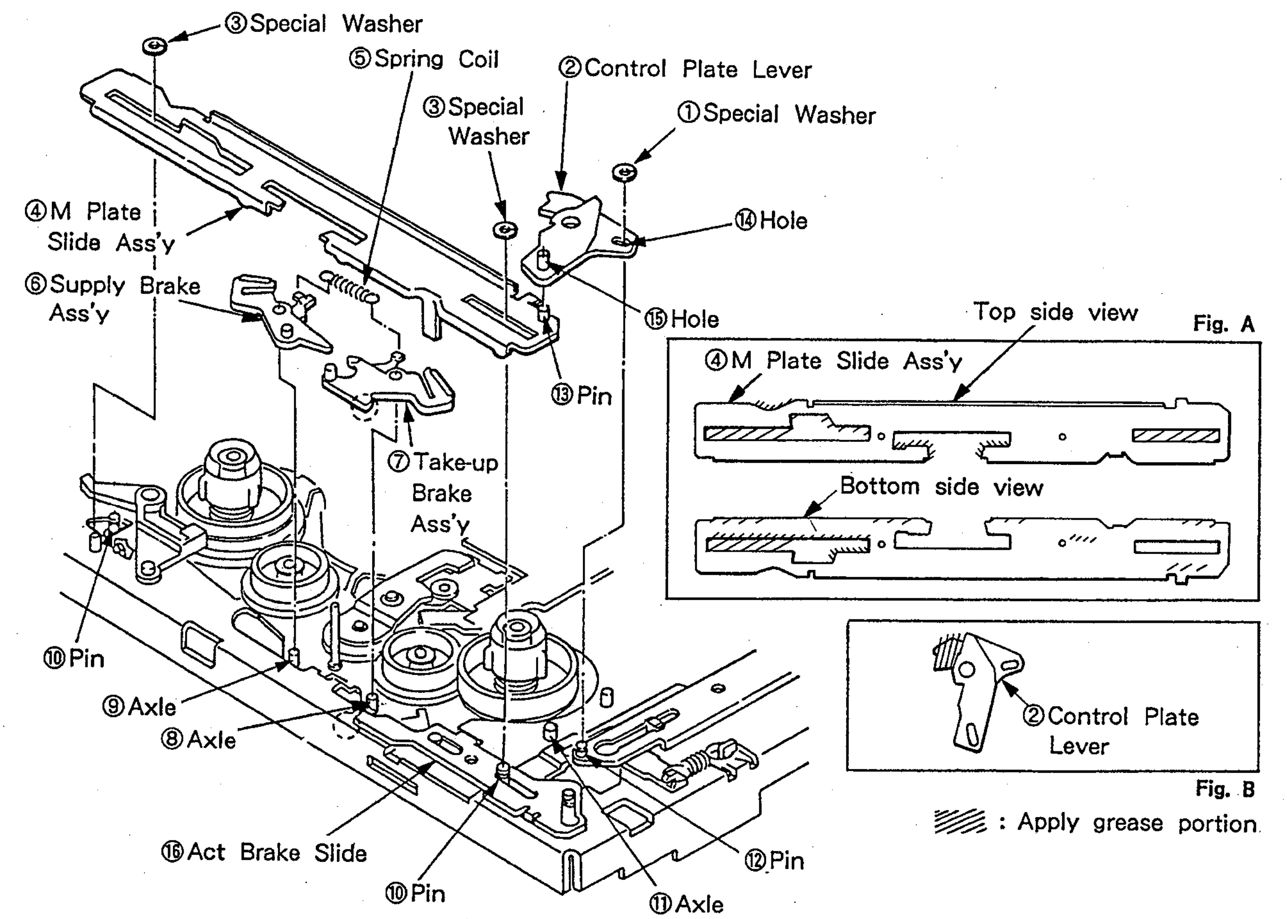
1. Removal

1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
2) Remove the SUB TAKE-UP BRAKE as instructed in 5-7-1.
3) Remove the special washer ①, then remove the CONTROL PLATE LEVER ②.
4) Remove the two special washers ③, then remove the M PLATE SLIDE ASS'Y ④.
5) Remove the SPRING COIL ⑤.
6) Remove the SUPPLY BRAKE ASS'Y ⑥ and the TAKE-UP BRAKE ASS'Y ⑦.

Note : Take care not to soil the brake shoes.

2. Remounting

1) Apply a thin layer of grease to axles ⑧ and ⑨.
2) Mount the TAKE-UP BRAKE ASS'Y ⑦ onto the axle ⑧.
3) Mount the SUPPLY BRAKE ASS'Y ⑥ onto the axle ⑨.
4) After applying a thin layer of grease to the M PLATE SLIDE ASS'Y ④ as shown in Fig. A, mount it onto the two pins ⑩.
5) Mount the two special washers ③ onto the two pins ⑩.
6) After applying grease to the CONTROL PLATE LEVER ② as shown in Fig. B, mount it onto the axle ⑪. Insert the ACT PLATE SLIDE ASS'Y pin ⑫ into the hole ⑭, and the M PLATE SLIDE ASS'Y pin ⑬ into the hole ⑮.
7) Mount the special washer ① onto the pin ⑫.
8) Mount the SUB TAKE-UP BRAKE as instructed in 5-7-1.
9) Mount the COMPL CASSETTE MECHANISM as instructed in 5-2-1.


③Special Washer
⑤Spring Coil
②Control Plate Lever
③Special Washer
①Special Washer
⑭Hole
④M Plate Slide Ass'y
⑥Supply Brake Ass'y
⑮Hole
⑬Pin
⑦Take-up Brake Ass'y
⑩Pin
⑨Axle
⑧Axle
⑯Act Brake Slide
⑩Pin
⑪Axle
⑫Pin
Top side view
Fig. A
④M Plate Slide Ass'y
Bottom side view
②Control Plate Lever
Fig. B

▨ : Apply grease portion

When assembling, the contact surfaces of Take-up Brake ⑦ and the Brake Slide ⑯ marked with ◌ should contact but not overlap each other.

Fig. 5-7-2. Supply Brake Ass'y & Take-up Brake Ass'y

5-7-3. Tension Lever Ass'y and Band Holder Ass'y (See Fig. 5-7-3.)

1. Removal

1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
2) Remove the SPRING COIL ①.
3) Remove the screw ③ fixing the BAND HOLDER ASS'Y ②.
4) Push the SUB SUPPLY BRAKE ④ in the direction of the arrow A, setting the BAND HOLDER ASS'Y ② free.
5) Open the hook ⑤ a little and remove the TENSION LEVER ASS'Y ⑥. Take care not to open the hook ⑤ too much, otherwise it may be deformed or broken.
6) Remove the hook ⑦ of the BAND HOLDER ASS'Y.

2. Remounting

1) Mount the BAND HOLDER ASS'Y hook ⑦ into the TENSION LEVER ASS'Y hole ⑧.
2) Insert the TENSION LEVER ASS'Y axle ⑨ into the hole ⑩ and confirm that the hook ⑤ is hooked.
3) While pushing the SUB SUPPLY BRAKE ④ in the direction of arrow A, mount the BAND HOLDER ASS'Y ② with the screw ③.
4) Hook the SPRING COIL ① between the hooks ⑪ and ⑫.
5) Perform TENSION POLE position adjustment as instructed in 6-3.
6) Mount the COMPL CASSETTE MECHANISM as instructed in 5-2-1.

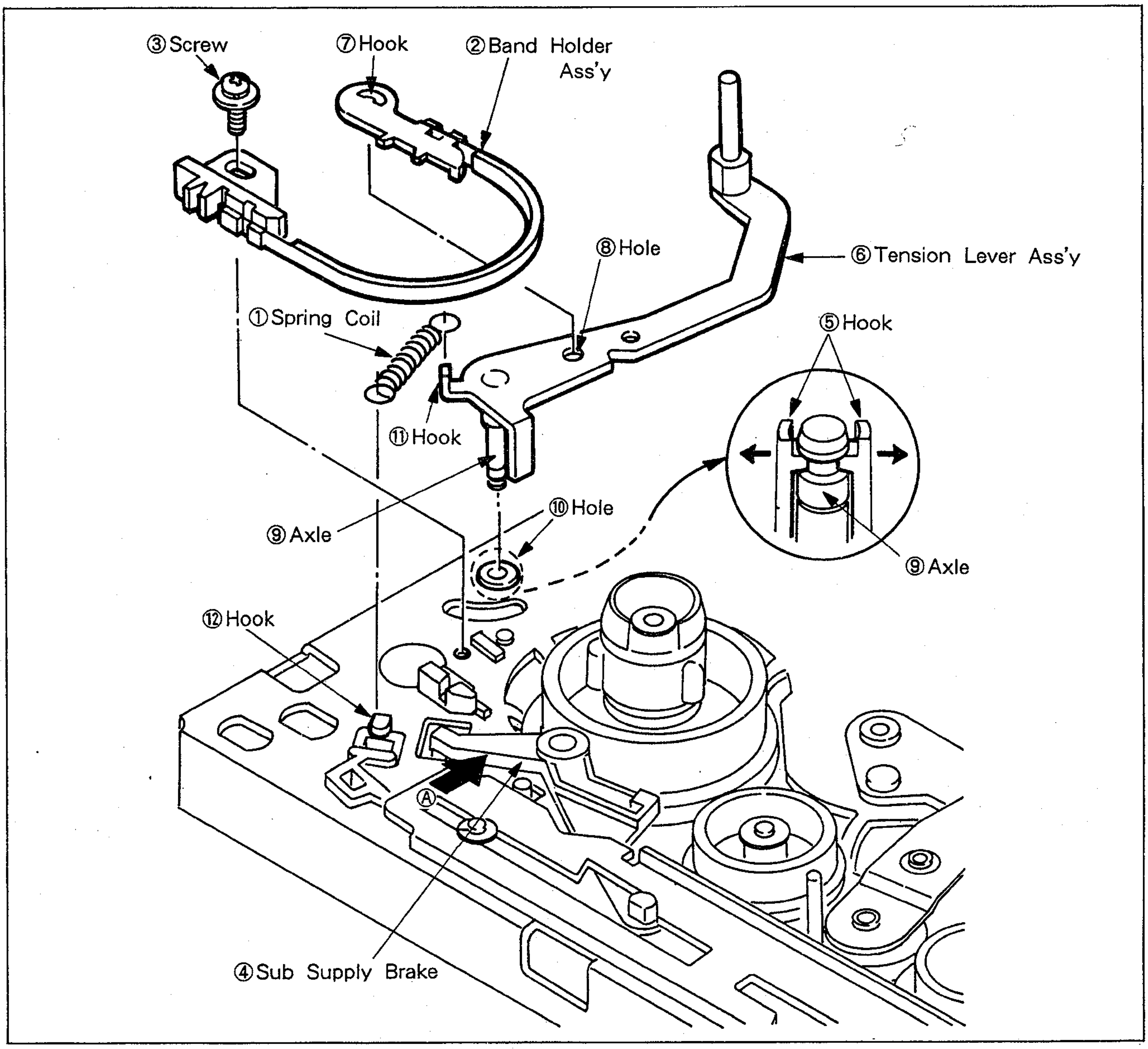

③Screw
⑦Hook
②Band Holder Ass'y
⑧Hole
⑥Tension Lever Ass'y
⑤Hook
①Spring Coil
⑪Hook
⑩Hole
⑨Axle
⑨Axle
⑫Hook
Ⓐ
④Sub Supply Brake

Fig. 5-7-3. Tension Lever Ass'y & Band Holder Ass'y

5-7-4. Capstan Brake Ass'y (See Fig. 5-7-4.)

1. Removal

1) Remove the SPRING COIL ①.
2) Unhook the hook ②, then remove the CAPSTAN BRAKE ASS'Y ③.

2. Remounting

1) Mount the CAPSTAN BRAKE ASS'Y ③ onto the axle ④. Confirm that the hook ② is hooked to the chassis.
2) Hook the SPRING COIL ① between hooks ⑤ and ⑥. Fix the hook ⑥ side with adhesive (use an adhesive that allows later detaching).

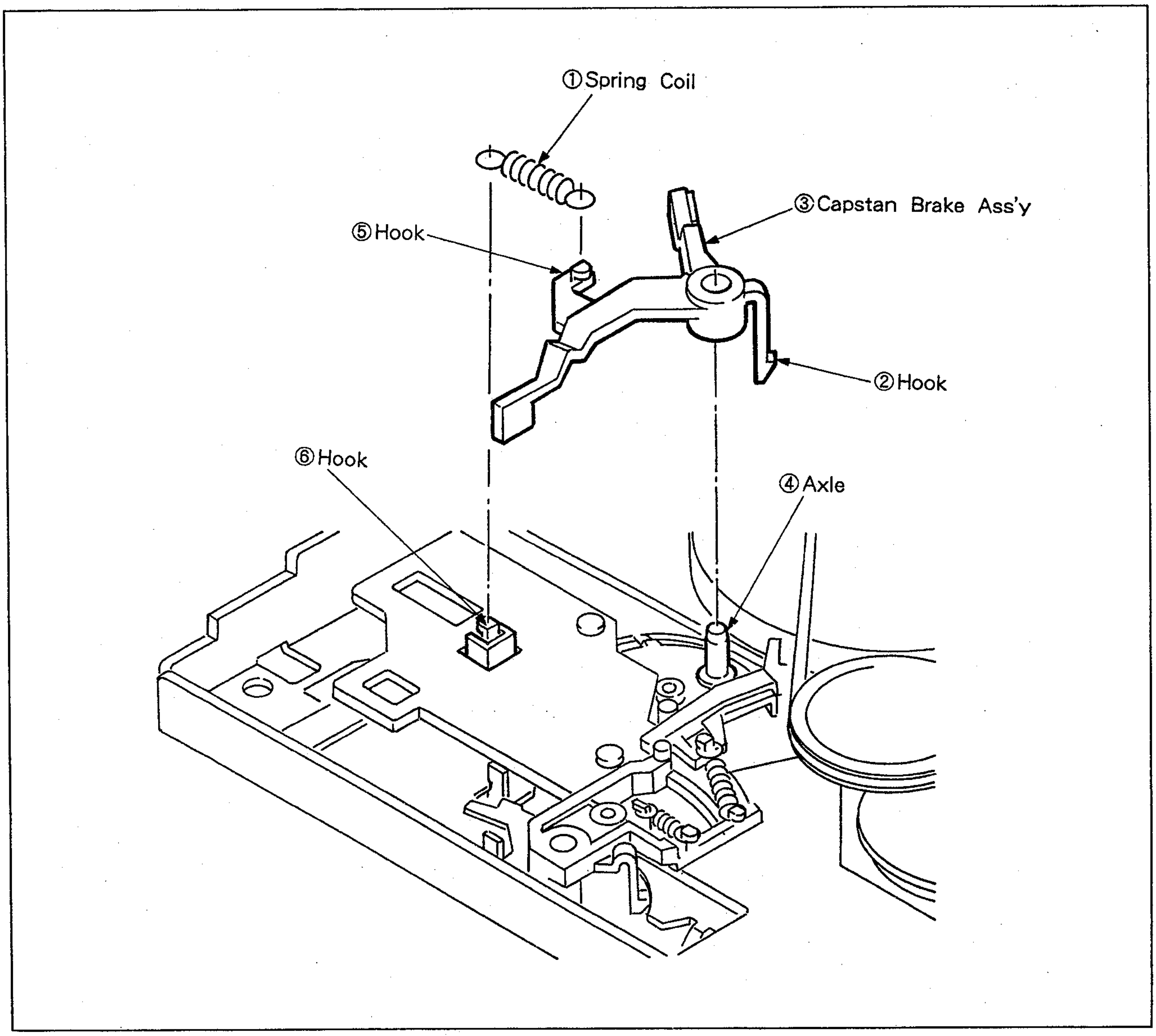

①Spring Coil
③Capstan Brake Ass'y
⑤Hook
②Hook
⑥Hook
④Axle

Fig. 5-7-4. Capstan Brake Ass'y

5-8. REEL TABLE DRIVE MECHANISM

5-8-1. Supply Reel Ass'y and Supply Reel Gear (See Fig. 5-8-1.)

1. Removal

1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
2) Remove the BAND HOLDER ASS'Y as instructed in 5-7-3.
3) Set the PLAY mode with the mode selector (VHJ-0050).
4) Remove the special washer ①, then remove the SUPPLY REEL ASS'Y ② and the washer ③.
5) Remove the special washer ④.
6) While pushing the SUPPLY BRAKE ASS'Y ⑤ in the direction of arrow A, remove the SUPPLY REEL GEAR ⑥ and the washer ⑦.

Note : Be sure that no dirt gets on the section where both brake shoes make contact.

2. Remounting

1) Apply a little oil (less than one drop) to the part of the axle ⑧ indicated by the arrow B, then mount the washer ⑦.
2) While pushing the SUPPLY BRAKE ASS'Y ⑤ in the direction of arrow A, mount the SUPPLY REEL GEAR ⑥ onto the axle ⑧.
3) Mount the special washer ④ to the axle ⑧.
4) Apply 1 drop of oil to the part of the axle ⑨ indicated by the arrow C, then mount the washer ③.
5) Mount the SUPPLY REEL ASS'Y ② onto the axle ⑨.
6) Perform reel table height adjustment as instructed in 6-2-1.
7) Mount the special washer ① onto the axle ⑨.
8) Mount the BAND HOLDER ASS'Y as instructed in 5-7-3.
9) Perform tension pole position adjustment as instructed in 6-3.
10) Mount the COMPL CASSETTE MECHANISM as instructed in 5-2-1.

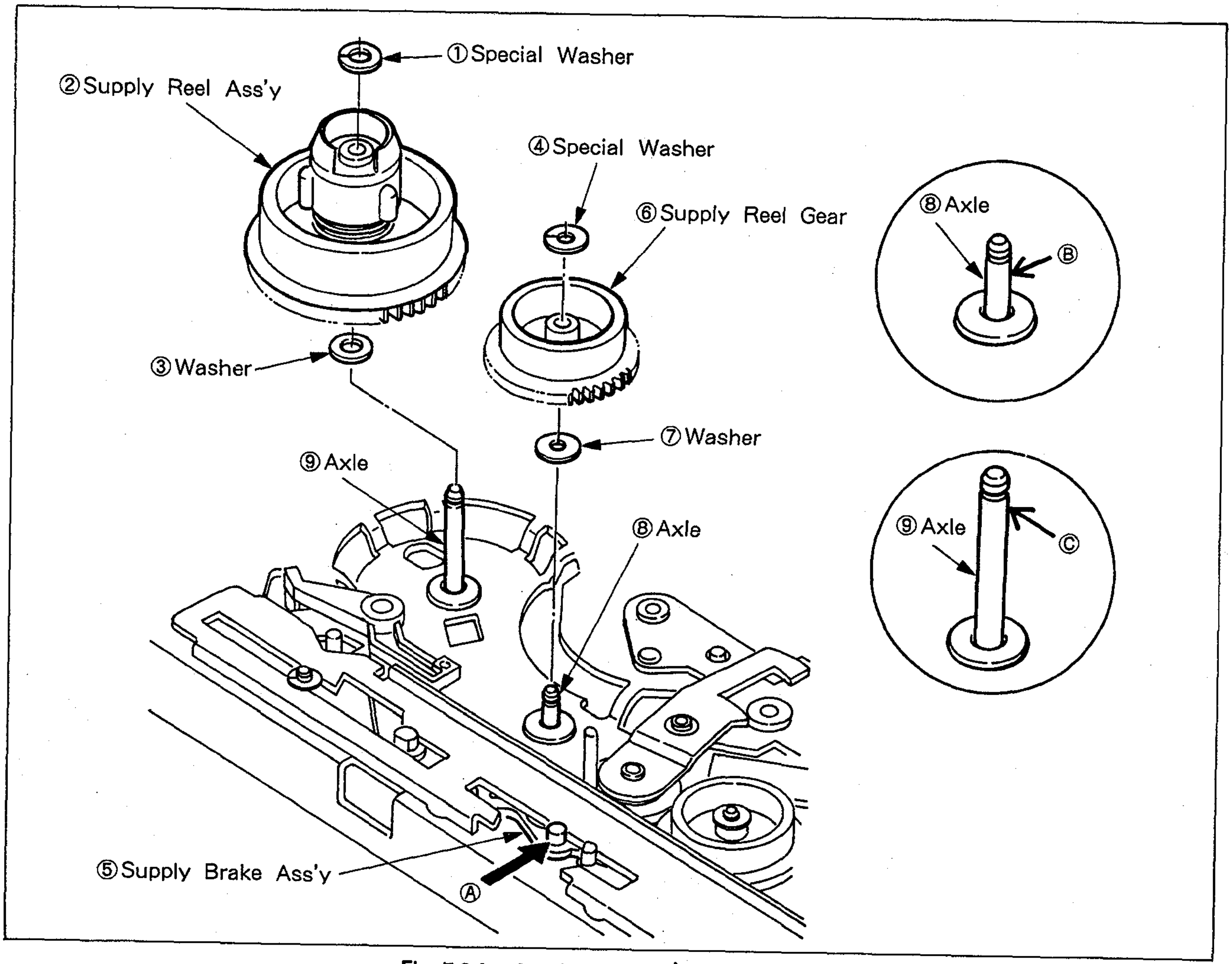


Fig. 5-8-1. Supply Reel Ass'y & Supply Reel Gear

5-8-2. Take-up Reel Ass'y (See Fig. 5-8-2.)

1. Removal

1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
2) Remove the special washer ①.
3) Push the SUB TAKE-UP BRAKE ASS'Y ② in the direction of arrow A to release the brake, then remove the TAKE-UP REEL ASS'Y ③ and the washer ④.

Note : Be sure that no dirt gets on the section where both brake shoes make contact.

2. Remounting

1) Apply 1 drop of oil to the part of the axle ⑤ indicated by the arrow B, then mount the washer ④.
2) While pushing the SUB TAKE-UP BRAKE ASS'Y ② in the direction of arrow A, mount the TAKE-UP REEL ASS'Y ③ onto the axle ⑤.
3) Perform reel table height adjustment as instructed in 6-2.
4) Mount the special washer ① onto the axle ⑤.
5) Mount the COMPL CASSETTE MECHANISM as instructed in 5-2-1.

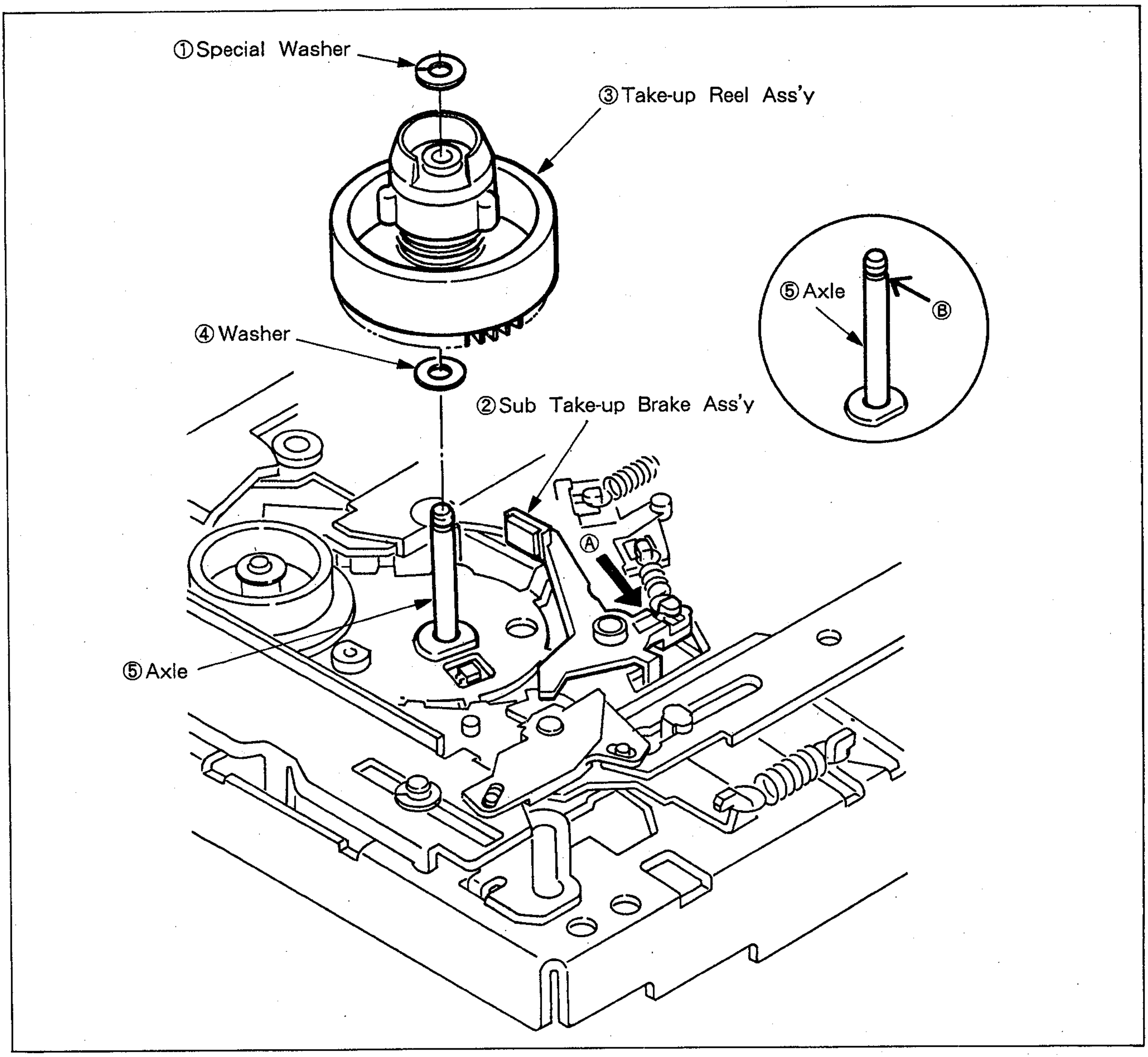


Fig. 5-8-2. Take-up Reel Ass'y

5-8-3. Take-up Reel Gear (See Fig. 5-8-3.)

1. Removal

1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
2) Remove the TAKE-UP REEL ASS'Y as instructed in 5-8-2.
3) Remove the SUB TAKE-UP BRAKE ASS'Y as instructed in 5-7-1.
4) Remove the TAKE-UP BRAKE ASS'Y as instructed in 5-7-2.
5) Remove the special washer ①, then remove the TAKE-UP REEL GEAR ③ and the washer ④.

2. Remounting

1) Apply a little oil (less than one drop) to the part of the axle ⑤ indicated with an arrow.
2) Mount the washer ④ and the TAKE-UP REEL GEAR ③ onto the axle ⑤.
3) Mount the special washer ① onto the axle ⑤.
4) Mount the TAKE-UP BRAKE ASS'Y as instructed in 5-7-2.
5) Mount the SUB TAKE-UP BRAKE ASS'Y as instructed in 5-7-1.
6) Mount the TAKE-UP REEL ASS'Y as instructed in 5-8-2.
7) Mount the COMPL CASSETTE MECHANISM as instructed in 5-2-1.

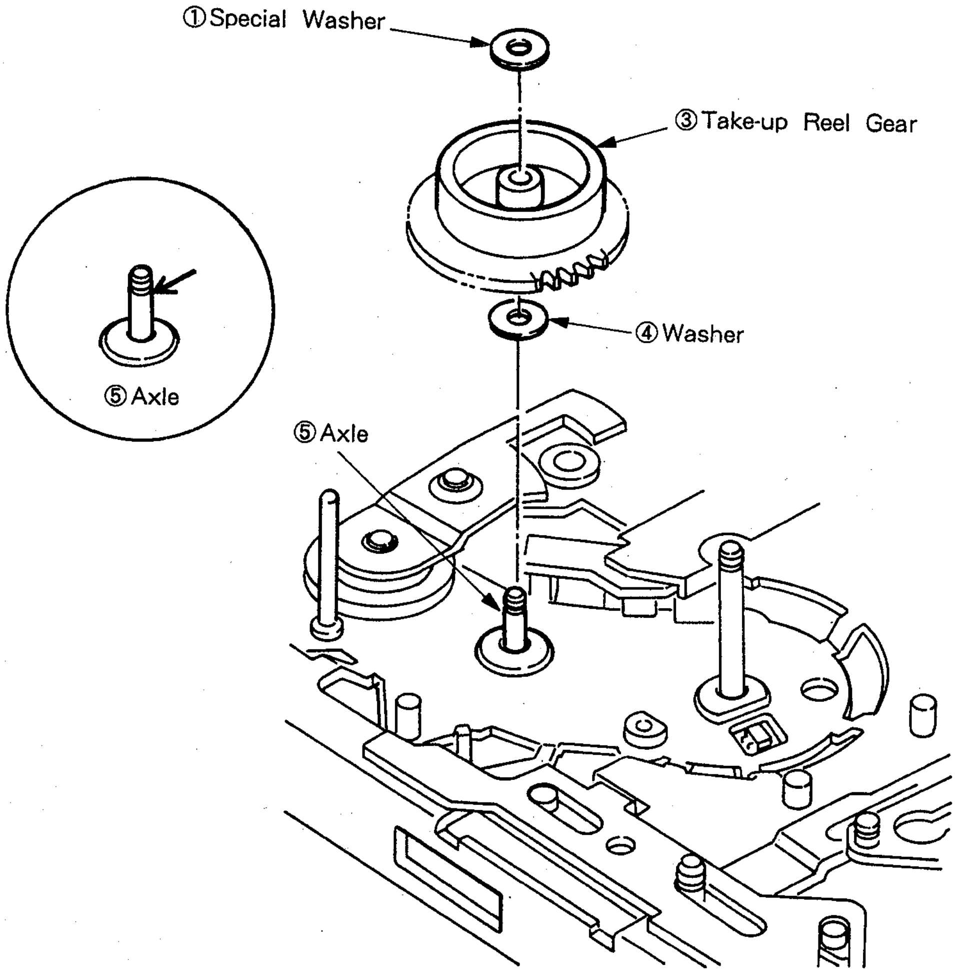


Fig. 5-8-3. TaKe-up Reel Gear

5-8-4. Reel Pulley and Friction Gear Ass'y (See Fig. 5-8-4.)

1. Removal

1) Remove the two screws ①, then remove the PULLEY BRACKET ②.
2) Remove the REEL DRIVE BELT ③.
3) Remove the special washer ④, then remove the REEL PULLEY ⑤.
4) Remove the special washer ⑥, then remove the FRICTION GEAR ASS'Y ⑦ and the washer ⑧.

2. Remounting

1) Apply one drop of oil to the parts of axles ⑨ and ⑩ indicated with an arrow.
2) Mount the washer ⑧ and the FRICTION GEAR ASS'Y ⑦ onto the axle ⑨.
3) Mount the special washer ⑥ onto the axle ⑨.
4) Mount the REEL PULLEY ⑤ onto the axle ⑩.
5) Mount the special washer ④ onto the axle ⑩.
6) Set the REEL DRIVE BELT ③.
7) Mount the PULLEY BRACKET ② with the two screws ①.

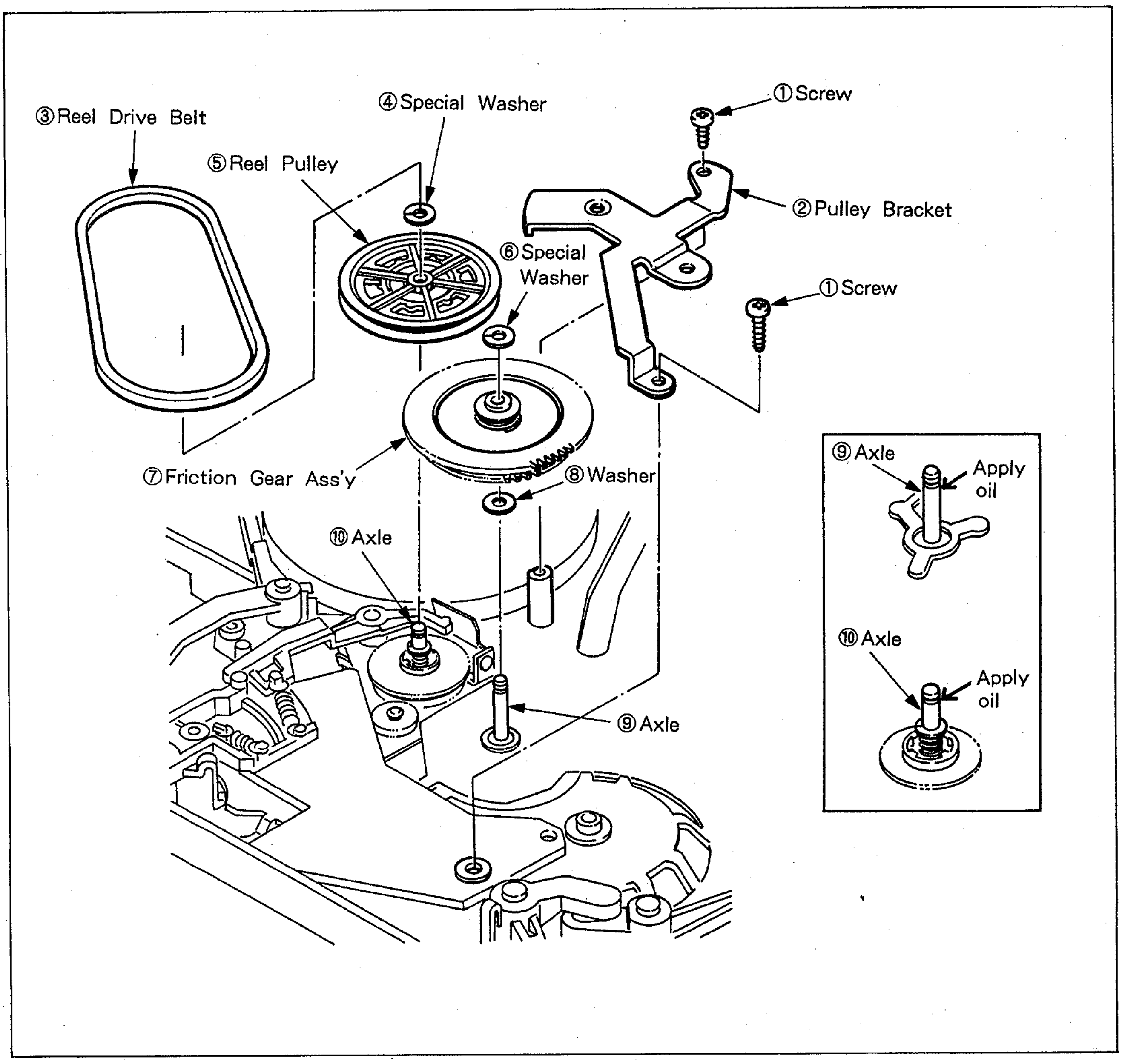

③Reel Drive Belt
④Special Washer
①Screw
⑤Reel Pulley
②Pulley Bracket
⑥Special Washer
①Screw
⑦Friction Gear Ass'y
⑧Washer
⑩Axle
⑨Axle
⑨Axle
Apply oil
⑩Axle
Apply oil

Fig. 5-8-4. Reel Pulley & Friction Gear

5-8-5. COMPL Clutch (See Fig. 5-8-5.)

1. Removal

1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
2) Remove the PULLEY BRACKET, the REEL DRIVE BELT and the REEL PULLEY as instructed in 5-8-4.
3) Remove the screw ①, then remove the COMPL MC-4 ②.
4) Remove the two screws ③, then remove the COMPL CLUTCH ④.

2. Remounting

1) Mount the COMPL CLUTCH ④ with the two screws ③, aligning it with the protuberance ⑤.
2) After inserting the CN831 (COMPL MC-4) into the CN801 (COMPL MC-1), mount the COMPL MC-4 with the screw ①.
3) Mount the REEL PULLEY, the REEL DRIVE BELT and the PULLEY BRACKET as instructed in 5-8-4.
4) Mount the COMPL CASSETTE MECHANISM as instructed in 5-2-1.

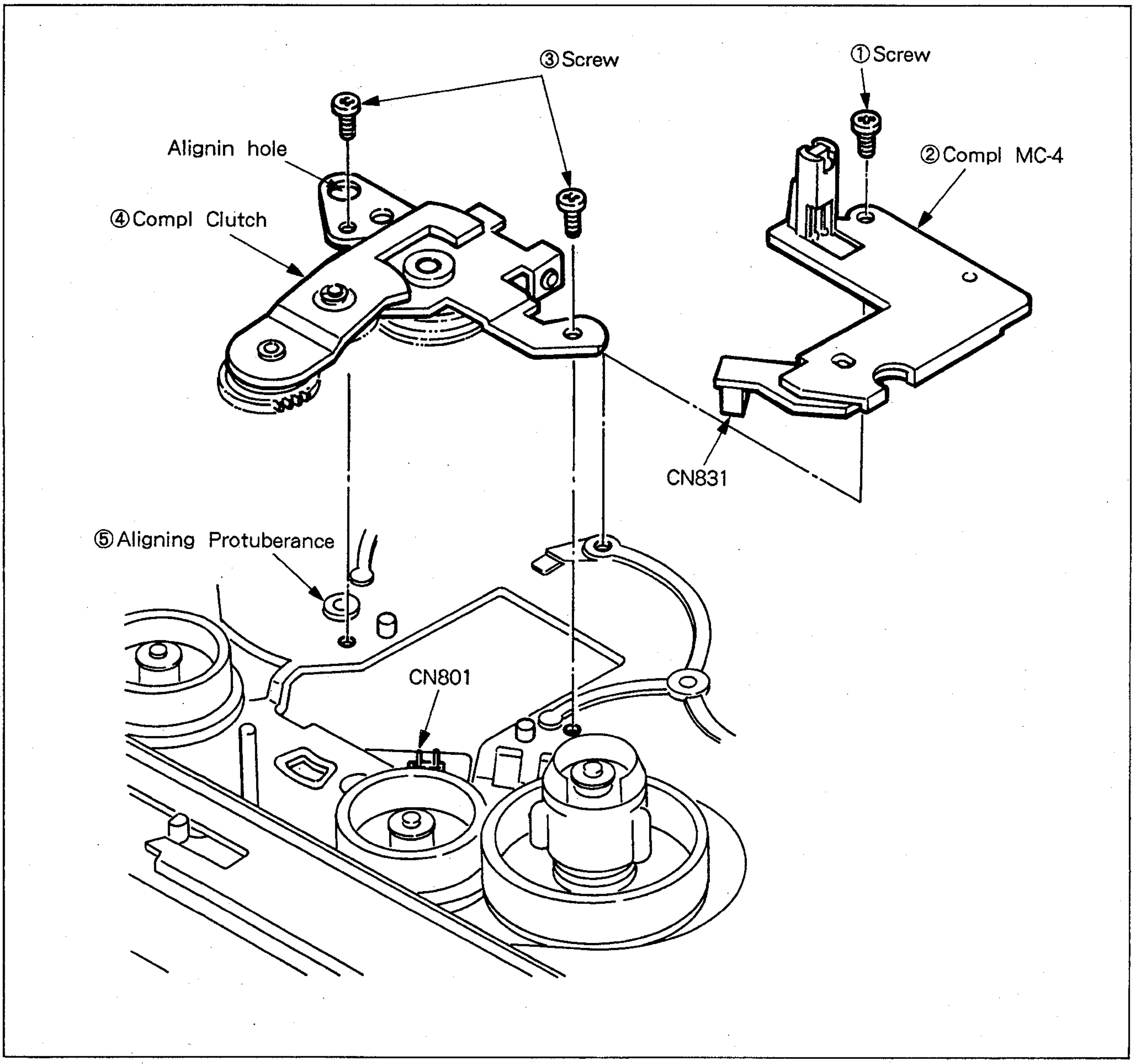

③Screw
①Screw
Alignin hole
②Compl MC-4
④Compl Clutch
CN831
⑤Aligning Protuberance
CN801

Fig. 5-8-5. Compl Clutch

5-8-6. Clutch Change Lever and Clutch Lever Ass'y (See Fig. 5-8-6.)

1. Removal

1) Remove the CAPSTAN BRAKE ASS'Y as instructed in 5-7-4.
2) Remove the PULLEY BRACKET, the REEL DRIVE BELT and the REEL PULLEY as instructed in 5-8-4.
3) Remove the SPRING COIL ①.
4) Unhook the hook ②, then remove the CLUTCH CHANGE LEVER ③.
5) Unhook the hook ⑤, then remove the CLUTCH LEVER ASS'Y ⑥.

2. Remounting

1) Mount the CLUTCH LEVER ASS'Y ⑥ onto the axle ⑦. Confirm that the hook ⑤ is hooked to the chassis.
2) Mount the CLUTCH CHANGE LEVER ③ onto the axle ⑧. Confirm that the hook ② is hooked to the chassis.
3) Hook the SPRING COIL ① between the hooks ⑨ and ⑩.
4) Mount the PULLEY BRACKET, the REEL DRIVE BELT and the REEL PULLEY as instructed in 5-8-4.
5) Mount the CAPSTAN BRAKE ASS'Y as instructed in 5-7-4.

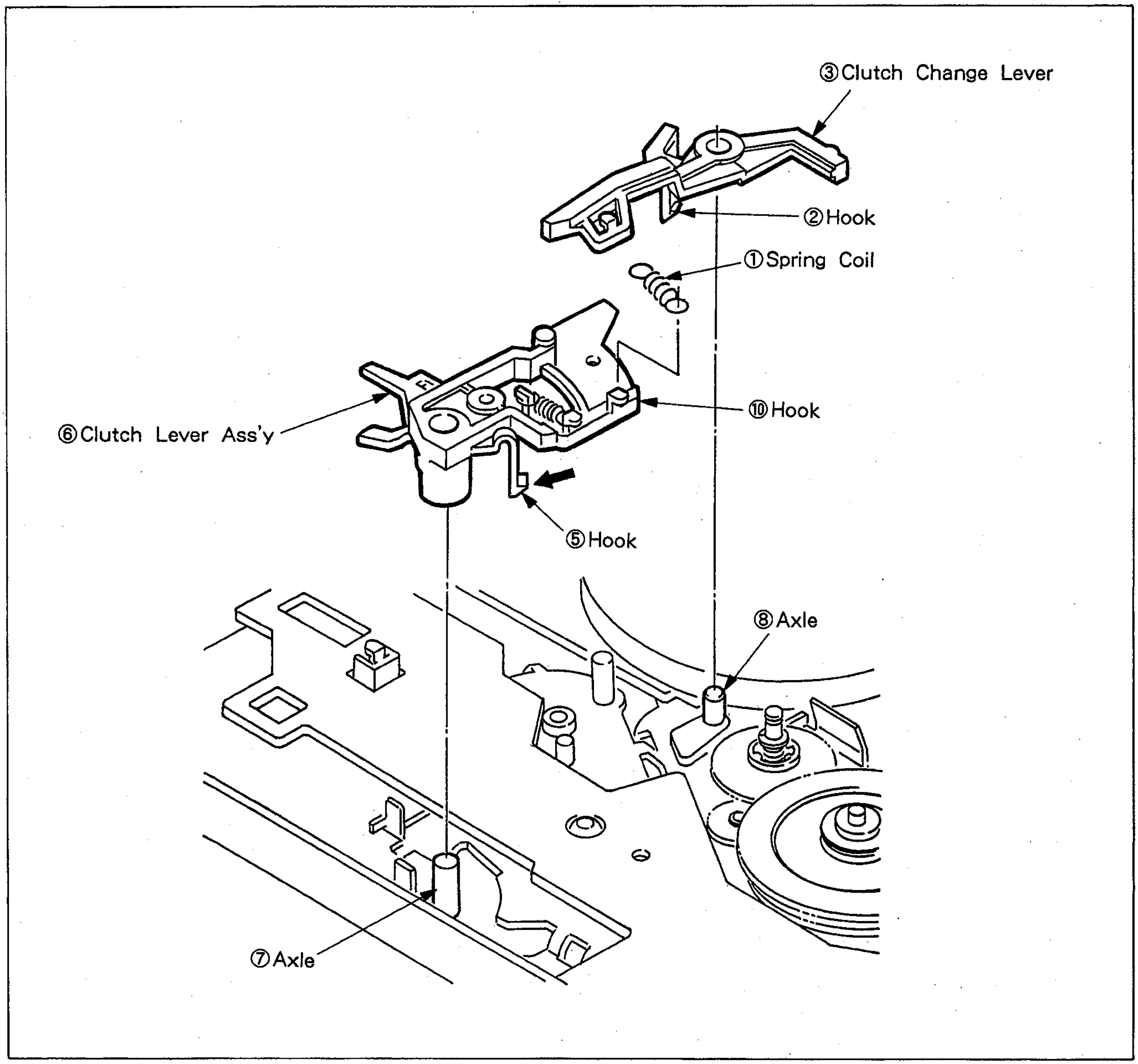


Fig. 5-8-6. Clutch Change Lever & Clutch Lever Ass'y

5-9. CAPSTAN MOTOR (See Fig. 5-9-1.)

1. Removal

1) Remove the CAPSTAN BRAKE ASS'Y as instructed in 5-7-4.
2) Remove the CAPSTAN MOTOR ⑥ connector.
3) Remove the REEL DRIVE BELT ② from the CAPSTAN MOTOR PULLEY ①.
4) Remove the two screws ④ fixing the COMPL CASSETTE MECHANISM TOP BOARD ③, then slide the TOP BOARD ③ backward.
5) Remove the three screws ⑤, then remove the CAPSTAN MOTOR ⑥.

Note : Take care not to scratch or soil the capstan axle.

2. Remounting

1) Mount the CAPSTAN MOTOR ⑥ with the three screws ⑤.
2) Connect the CAPSTAN MOTOR ⑥ connector.
3) Mount the TOP BOARD ③ with the two screws ④.
4) Fit the REEL DRIVE BELT ② around the CAPSTAN MOTOR PULLEY ① and the REEL PULLEY ⑦.
5) Mount the CAPSTAN BRAKE ASS'Y as instructed in 5-7-4.

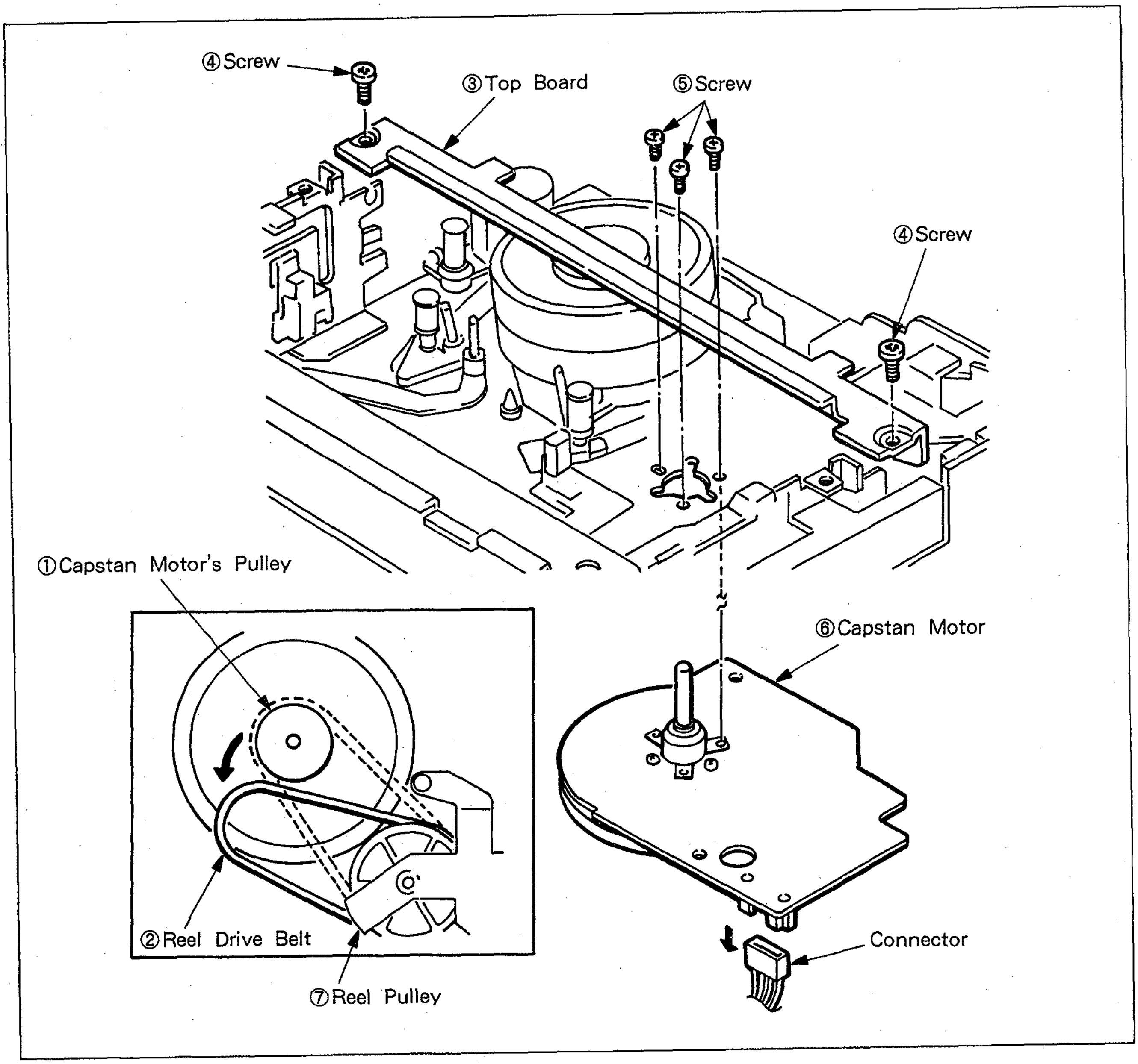

④Screw
③Top Board
⑤Screw
④Screw
①Capstan Motor's Pulley
⑥Capstan Motor
②Reel Drive Belt
⑦Reel Pulley
Connector

Fig. 5-9-1. Capstan Motor

5-10. FIXED GUIDE, FE HEAD LEVER ASS'Y

5-10-1. Entrance side Fixed Guide and FE Lever Ass'y (See Fig. 5-10-1.)

1. Removal

1) Remove the SP NUT ①, then remove the GUIDE PIPE ③ and the SP washer ② (lower), in that order.
2) Remove the SPRING COIL ⑤.
3) Remove the FTE HEAD connector.
4) Remove the special washer ⑥, then remove the FE HEAD LEVER ASS'Y ⑦.

Note : A SP washer ⑪ (upper) and a SPRING COIL ④ are sometimes inserted between the SP NUT ① and the special washer ⑥. In this case, put it back in its original position when remouting the entrance side fixed guide.

2. Remounting

1) After mounting the FE LEVER ASS'Y ⑦ onto the axle ⑧, mount the special washer ⑥.
2) Hook the SPRING COIL ⑤ between the chassis notch ⑨ and the FE LEVER ASS'Y hook ⑩.
3) Mount the SP washer ② (lower), the GUIDE pipe ③ and the SP NUT ① to the axle ⑧, in that order.
4) Connect the connector to the FTE HEAD.
5) Perform hight adjustment of the entrance side fixed guide (S) as instructed in 6-4 when remounted the SPRING COIL ④ and the SP washer ⑪ (upper).

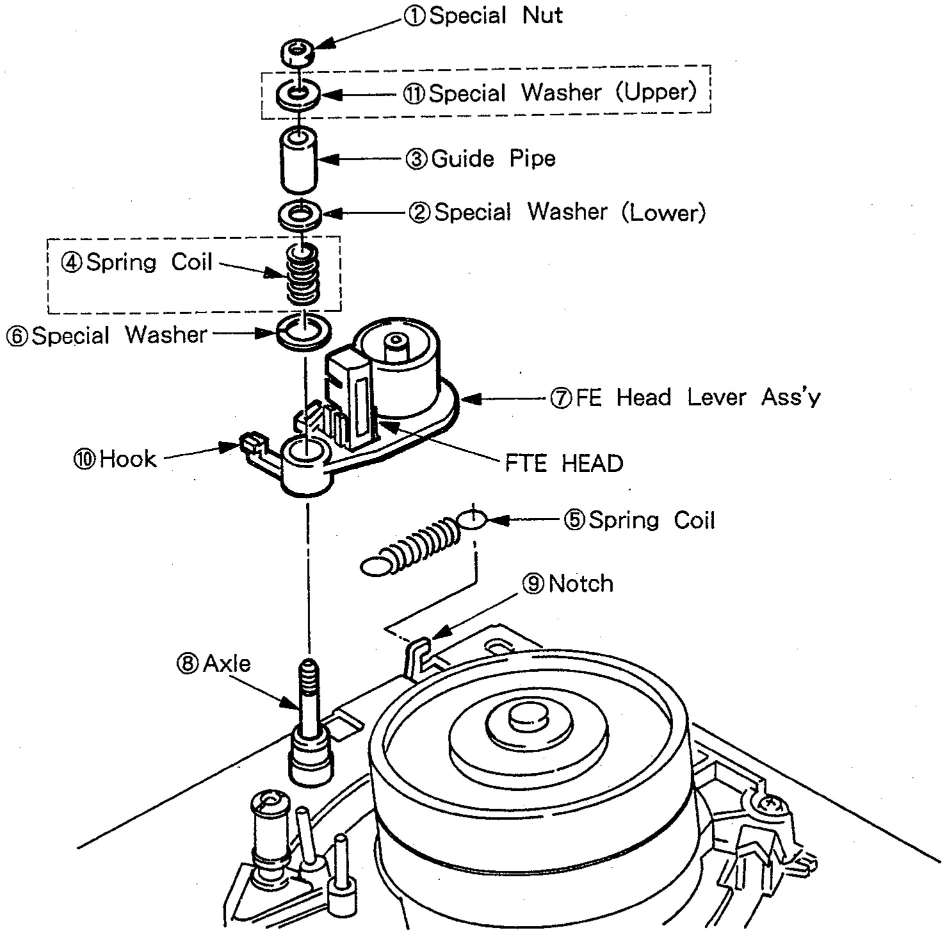

①Special Nut
⑪Special Washer (Upper)
③Guide Pipe
②Special Washer (Lower)
④Spring Coil
⑥Special Washer
⑦FE Head Lever Ass'y
⑩Hook
FTE HEAD
⑤Spring Coil
⑨Notch
⑧Axle

Fig. 5-10-1. Fixed Guide (S) & FE Lever Ass'y

5-10-2. Impedance Roller, FTE Head (See Fig. 5-10-2.)

1. Removal

1) Remove the FTE HEAD (full track erase head) ① connector.
2) Remove the special washer ②, then remove the IMPEDANCE ROLLER ③ and the washer ④.
3) Open the hook ⑤ a little and remove the FTE HEAD ①.

Note : Take care not to open the hook too much, otherwise it may be deformed or broken.

2. Remounting

1) Mount the FTE HEAD ① onto the FE HEAD LEVER ASS'Y ⑥. Confirm that the hook ⑤ is hooked to the FTE HEAD ①.
2) Mount the washer ④ and the IMPEDANCE ROLLER ③, in that order, onto the axle ⑦, then mount the special washer ②.
3) Connect the connector to the terminal of the FTE HEAD ①.

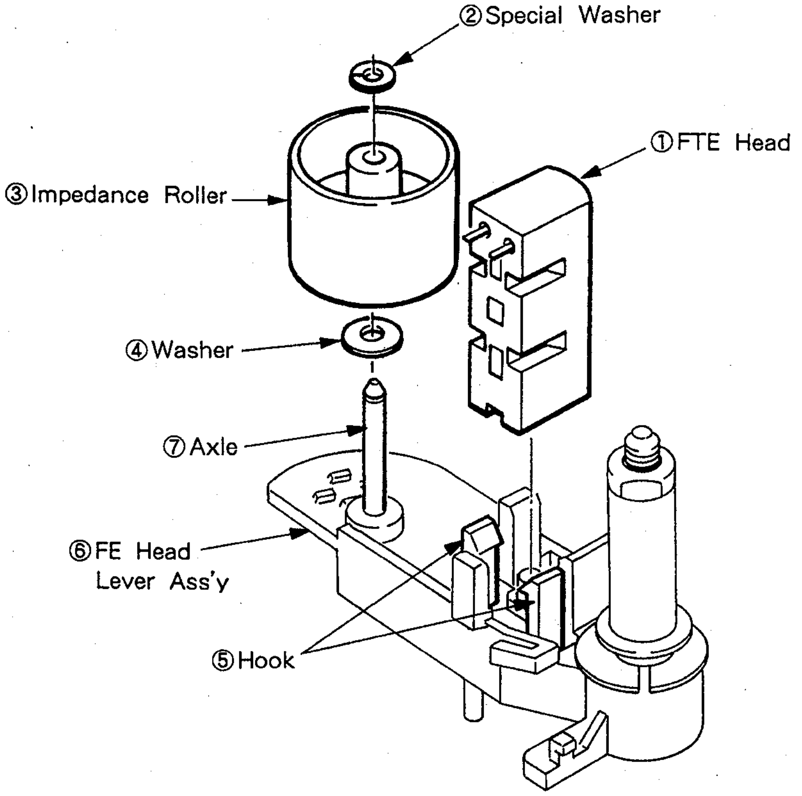

②Special Washer
①FTE Head
③Impedance Roller
④Washer
⑦Axle
⑥FE Head Lever Ass'y
⑤Hook

Fig. 5-10-2. Impedance Roller & FTE Head

5-10-3. Exit side Fixed Guide (See Fig. 5-10-3.)

1. Removal

1) Remove the CAP ①.
2) Remove the SP NUT ②, then remove the SP washer ③ (upper), the GUIDE PIPE ④, the SP washer ③ (lower) and the SPRING COIL ⑤, in that order.

2. Remounting

1) Mount the SPRING COIL ⑤, the SP washer ③ (lower), the GUIDE PIPE ④, the SP washer ③ (upper) and the SP NUT ②, in that order, to the axle ⑥.
2) Mount the CAP ① onto the axle ⑥.
3) Perform height adjustment of the fixed guide (T) as instructed in 6-4.

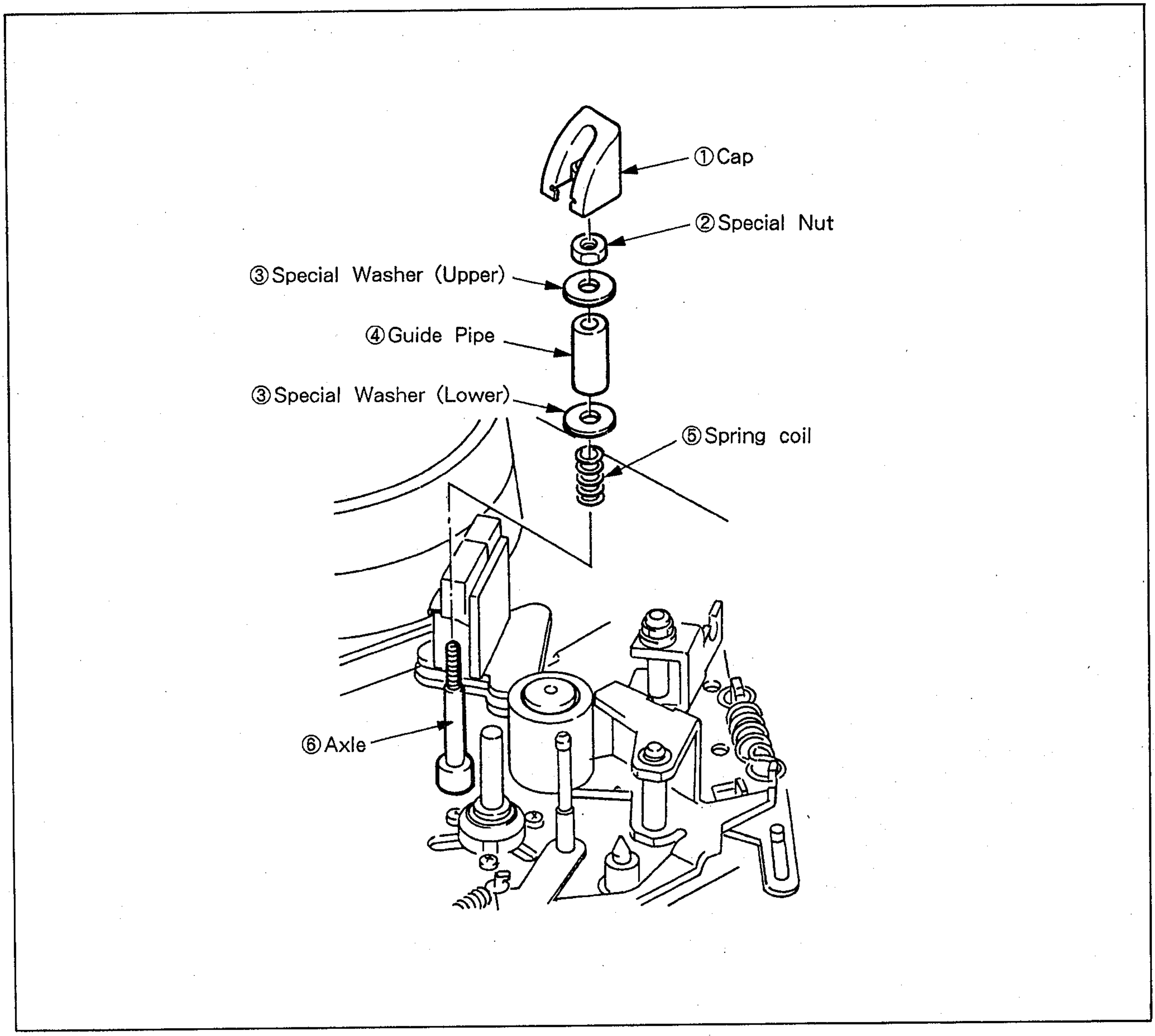

①Cap
②Special Nut
③Special Washer (Upper)
④Guide Pipe
③Special Washer (Lower)
⑤Spring coil
⑥Axle

Fig. 5-10-3. Fixed Guide (T)

5-11. DRUM SECTION

5-11-1. Drum Motor (rotor, stator) (See Fig. 5-11-1.)

1. Removal

1) Remove the screw ①, then remove the CYLINDER EARTH ASS'Y ②.
2) Remove the two screws ③, then remove the ROTOR ④ and SPACER.
3) Remove the STATOR board connector ⑩.
4) Remove the three screws ⑤, then remove the STATOR ⑥.

2. Remounting

1) Mount the STATOR ⑥ with the three screws ⑤.
2) Mount the SPACER ⑪ on to the AXLE ⑫.
3) While aligning the ROTOR oval hole ⑦ with the ROTOR DISK hole ⑧, mount the ROTOR with the two screws ③.
4) Insert the connector ⑩.
5) While aligning the CYLINDER EARTH ASS'Y ② protuberance with the chassis hole ⑨, mount it with the screw ①.

Note 1 : Use a torque driver (VHJ-0014) for mounting the STATOR ⑥ and the ROTOR ④. Set fastening torque to 3kg-cm.

Note 2 : When the drum unit has been replaced, perform a tape path adjustment as instructed in 6-4. and perform a CH-1/CH-2 switching position adjustment of the servo circuit.

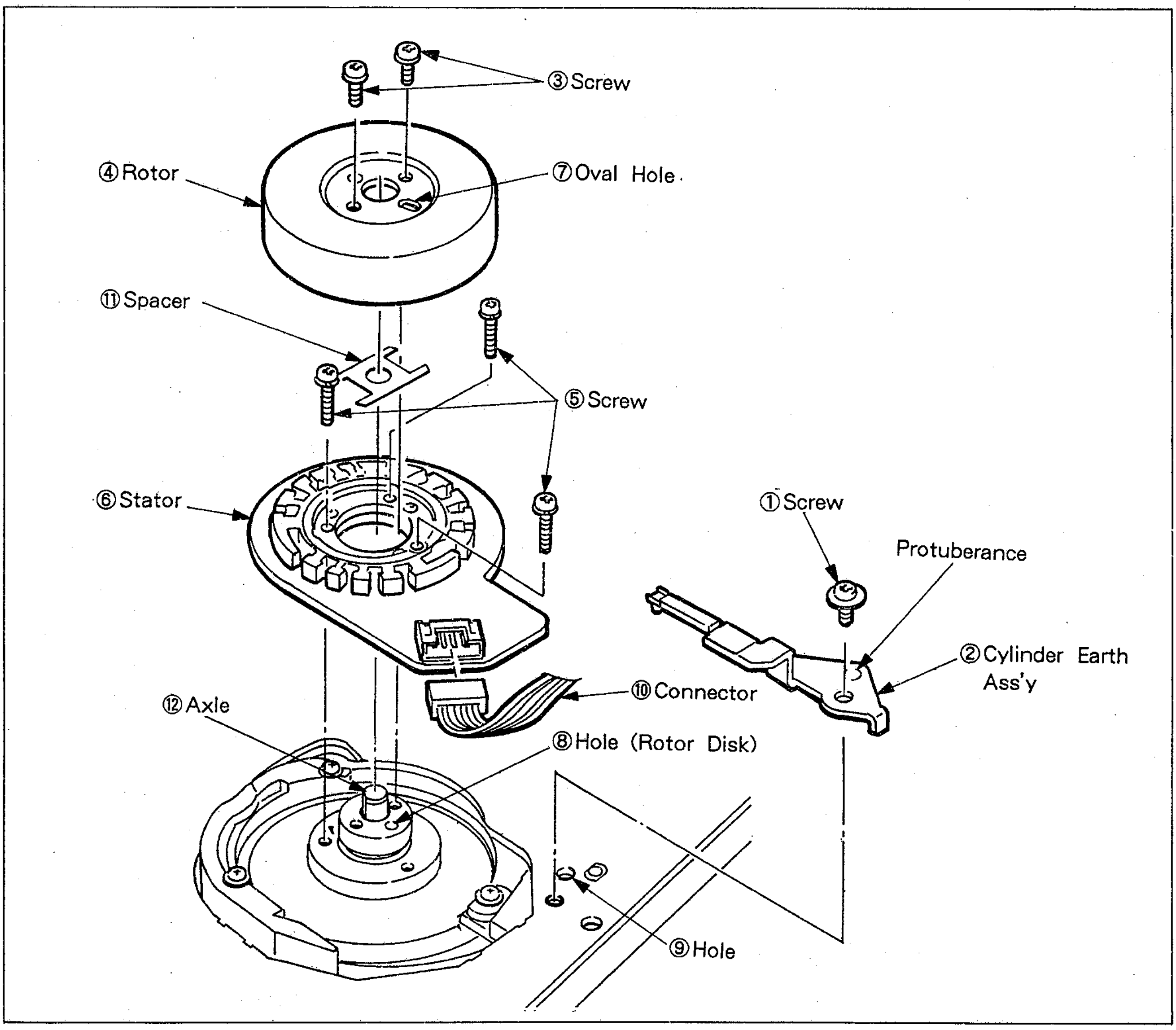

③Screw
④Rotor
⑦Oval Hole
⑪Spacer
⑤Screw
⑥Stator
①Screw
Protuberance
②Cylinder Earth Ass'y
⑩Connector
⑫Axle
⑧Hole (Rotor Disk)
⑨Hole

Fig. 5-11-1. Drum Motor

5-11-2. Drum Unit (See Fig. 5-11-2.)

1. **Removal**

1) For some models with the board located above the upper drum, remove the board.
2) Remove the flexible P.C.B. ① from the PRE-AMP UNIT (take care not to pull the flexible P.C.B. in the upward direction).
3) Remove the LOAD RACK only, as instructed in 5-4-1.
4) Remove the three screws ②, then remove the drum unit ③.

   NOTE : When removing and remounting the drum unit, handle it carefully to protect it from scratches and dirt.

2. **Remounting**

1) While aligning the drum unit ③ to the protuberance, mount it to the drum base (CYLINDER BASE) ⑤ with the three screws ②.
2) Mount the ROAD RACK as instructed in 5-4-1.
3) Insert the flexible P.C.B. into the PRE-AMP UNIT.
4) Clean the drum unit.
5) Perform the tape path adjustment as instructed in 6-4. and perform the CH-1/CH-2 switching position adjustment of the servo circuit.

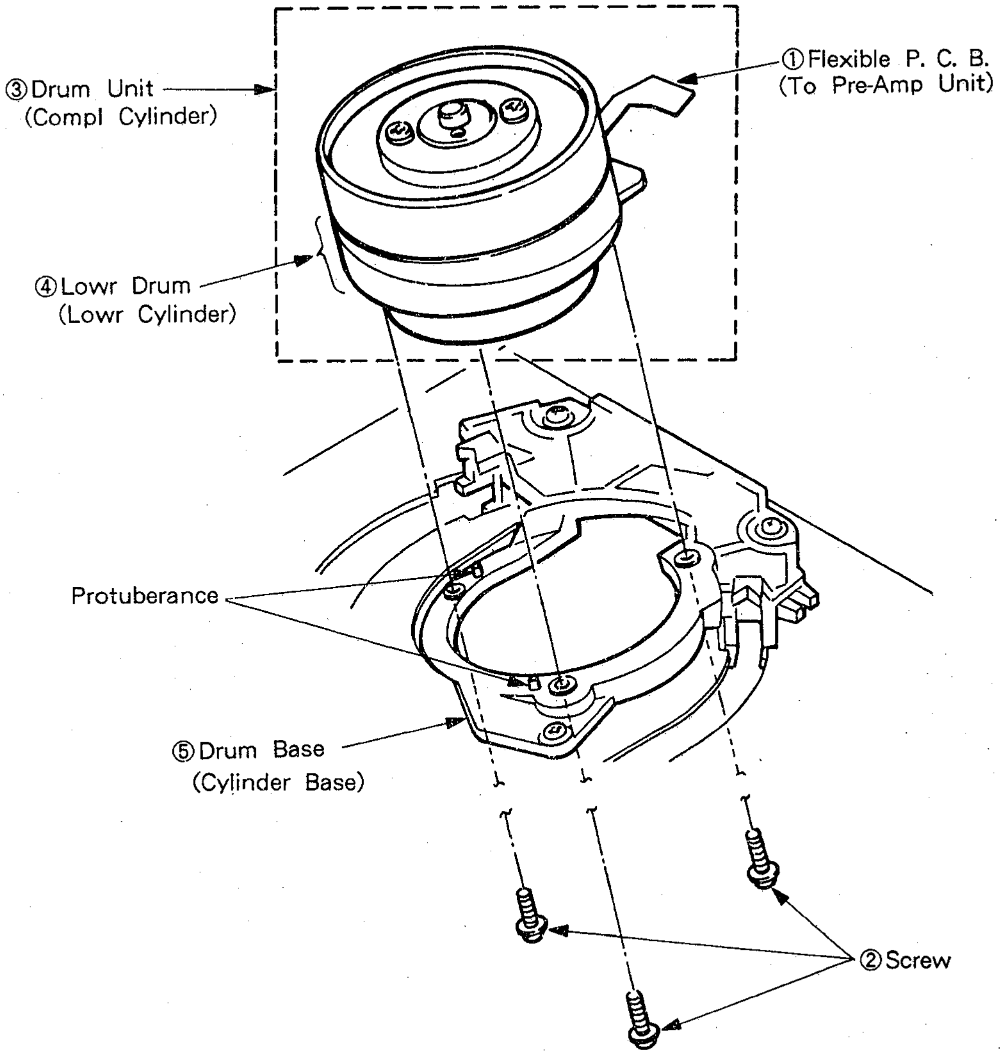

③Drum Unit
(Compl Cylinder)
①Flexible P. C. B.
(To Pre-Amp Unit)
④Lowr Drum
(Lowr Cylinder)
Protuberance
⑤Drum Base
(Cylinder Base)
②Screw

Fig. 5-11-2 Drum Unit (Compl Cylinder)

5-11-3. Upper Drum (Upper Cylinder)

1. Removal

1) Remove the two screws ① (see Fig. 5-11-3).
2) In case the RE (ROTARY ERASE) HEAD is attached to the upper drum (UPPER CYLINDER), remove the lead wires soldered from the P.C. board (see Fig. 5-11-4.).
3) Turn the head removing jig (VHJ-0041) handle ② counterclockwise to lift up the stopper ③ (see Fig. 5-11-5.).
4) Insert the two long screws ④ of the jig into the screw holes ⑥ located on the head chip side of the upper drum (UPPER CYLINDER) ⑤, then mount by turning the handle clockwise.
5) While holding the jig so that the upper drum ⑤ does not rotate, turn the handle ② clockwise to remove the upper drum.
6) Remove the jig from the upper drum.

Note : Handle parts carefully to protect the drum from scratches and dirt, and the video head from damage.

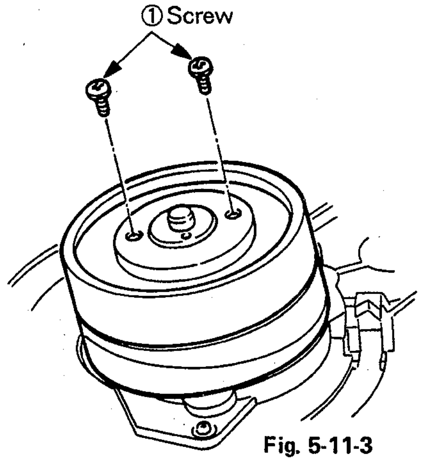


Fig. 5-11-3

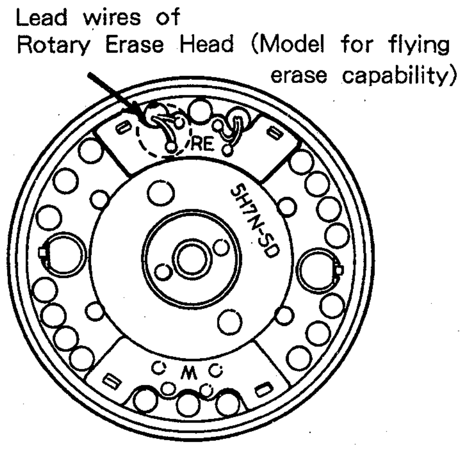

Lead wires of
Rotary Erase Head (Model for flying erase capability)
RE
5H7N-5D
C M C

Fig. 5-11-4

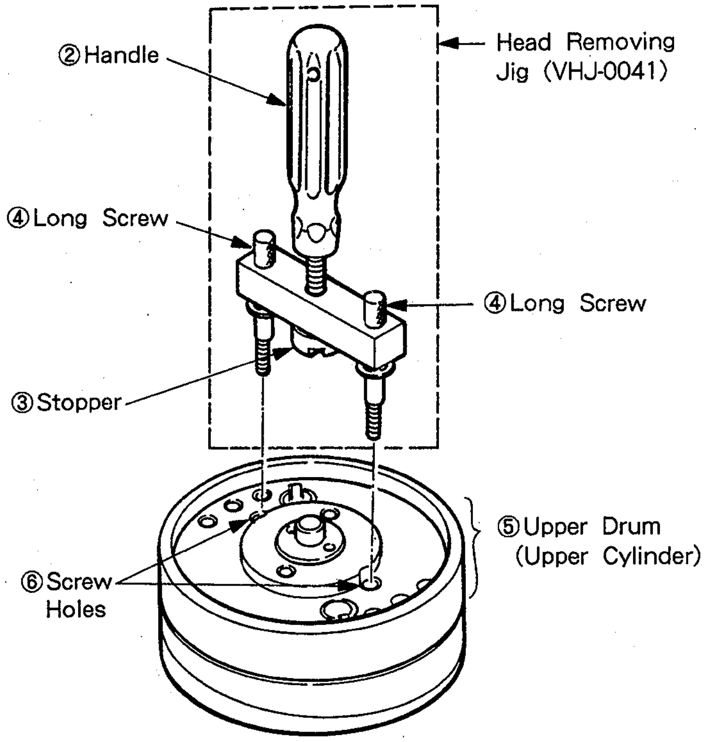

②Handle
Head Removing Jig (VHJ-0041)
④Long Screw
④Long Screw
③Stopper
⑤Upper Drum (Upper Cylinder)
⑥Screw Holes

Fig. 5-11-5

Upper Drum (Upper Cylinder)

2. Remounting (See Fig. 5-11-6.)

1) Confirm that surfaces where the flywheel and the upper drum (UPPER CYLINDER) are engaged or make contact portion are free from scratches and dirt.
2) The code name ① of the drum is printed on the video head side of the upper drum ⑤ SP CH-1 (channel A, plus azimuth). The code name ① is set with in the rotary transformer terminal round hole side ② position of lower drum (LOWER CYLINDER), so that the two screw holes ③ of the upper drum are aligned with the two screw holes ④ of the flywheel. (Refer to 3. Recognizing the SP CH-1 Head side).
3) In case the RE (ROTARY ERASE) HEAD is attached to the upper drum, pass the lead wires through the lead wire hole. (See Fig.5-11-4.)
4) While keeping the upper drum ⑤ parallel to the lower drum (LOWER CYLINDER) ⑧, insert it completely into the flywheel.
5) Temporarily tighten the two screws ⑦ alternately a little at a time, then tighten them to a torque of 6kg-cm using a torque driver (VHJ-0014) and a 3mm bit (VHJ-0045).
6) In case the RE head is attached to the upper drum ⑤, solder the lead wires to the P.C. board. Solder the red lead wire to the R terminal, and the yellow lead wire to the Y terminal.

Note : When the upper drum has been replaced, perform a tape path adjustment as instructed in 6-4. and CH-1/CH-2 switching position adjustment of the servo circuit.

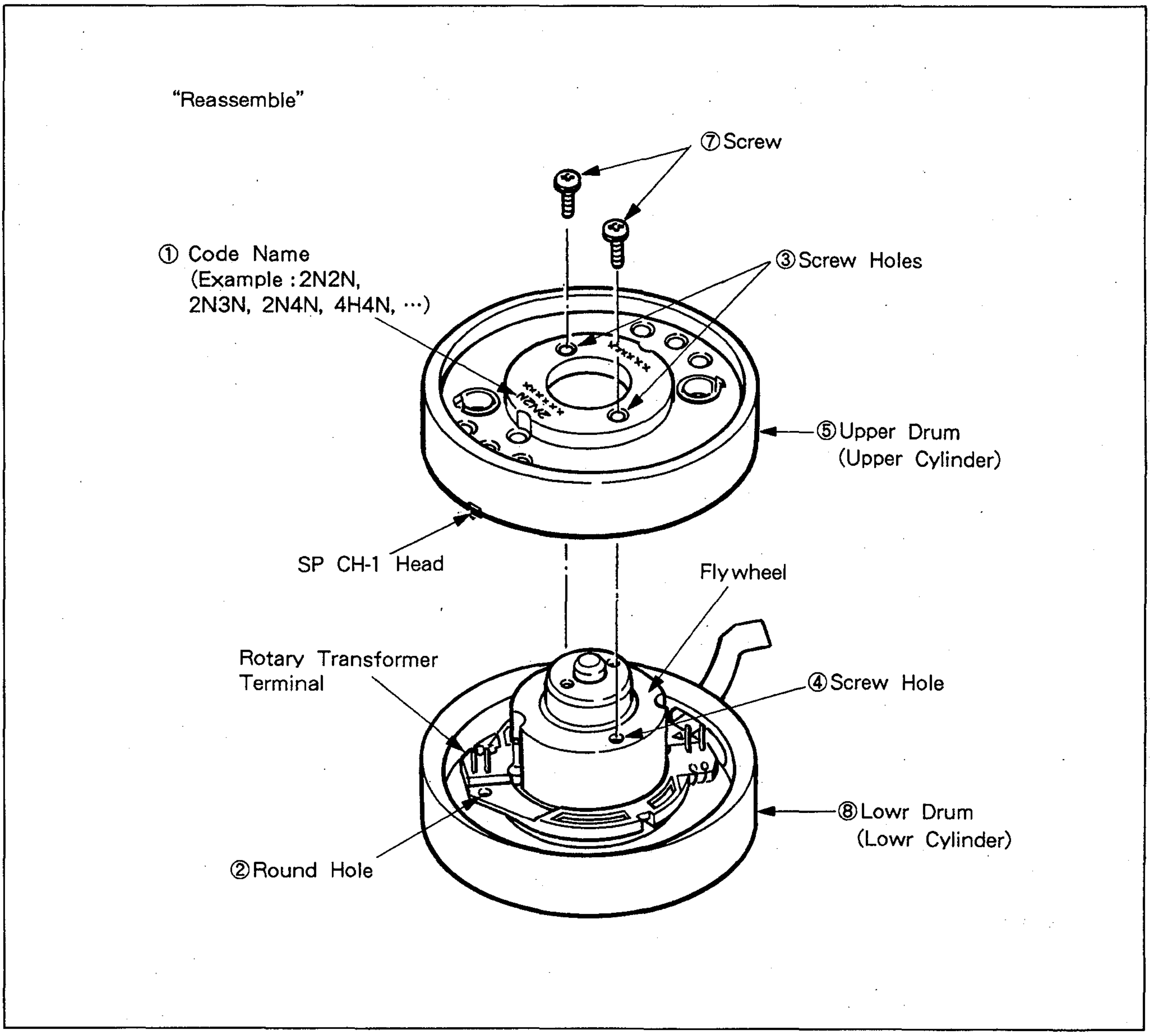
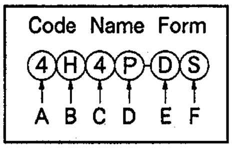

"Reassemble"
⑦Screw
① Code Name
(Example : 2N2N,
2N3N, 2N4N, 4H4N, …)
③Screw Holes
⑤Upper Drum
(Upper Cylinder)
SP CH-1 Head
Flywheel
Rotary Transformer
Terminal
④Screw Hole
⑧Lowr Drum
(Lowr Cylinder)
②Round Hole

Fig. 5-11-6.

3. **Recognizing the SP CH-1 Head Side**
   No playback picture can be obtained if the video head is not wired as a pair with the rotary transformer located inside the lower drum rotating section. Therefore, mounting position should be matched when mounting the upper drum. In the P90 mechanism series, the code name of the drum is printed on the SP CH-1 (CH-A, plus azimuth) side as a mark for mounting the upper drum. (See Fig. 5-11-7.) This code name differs according to the drum type, but its basic form is as follows :


Code Name Form
4 H 4 P D S
A B C D E F

A = Number of head bases
B = "N" for normal audio
"H" for HI-FI audio
C = Number of heads
D = TV system ("N" or "P")
EF = Code for detailed classification. Depending on drum type, it can also be just one character, or a blank space.

Examples of Detailed Classification Codes
V = Head with level difference
D = Compatible with digital units
S = SVHS-compatible

Examples of Code Names
2N2P, 2N2P-L, 2N2P-V, 2N2P-D, 2N3P, 2N4P, 4H4P, 4H4P-D

Moreover, there is a round hole with marking purposes on the SP CH-1 (CH-A, plus azimuth) side of the lower drum rotary transformer terminal. As shown in Fig. 5-11-8, there are two types of rotary transformer terminals (the number of pins differs according to the number of heads).

Note : When ordering parts such as drums (CYLINDERS), do not use the code names ; always refer to the parts list and order with the specified part numbers.

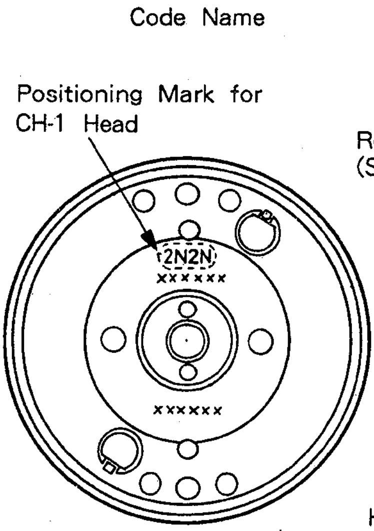

Code Name
Positioning Mark for CH-1 Head
2N2N
xxxxxx
xxxxxx

Fig. 5-11-7. Upper Drum

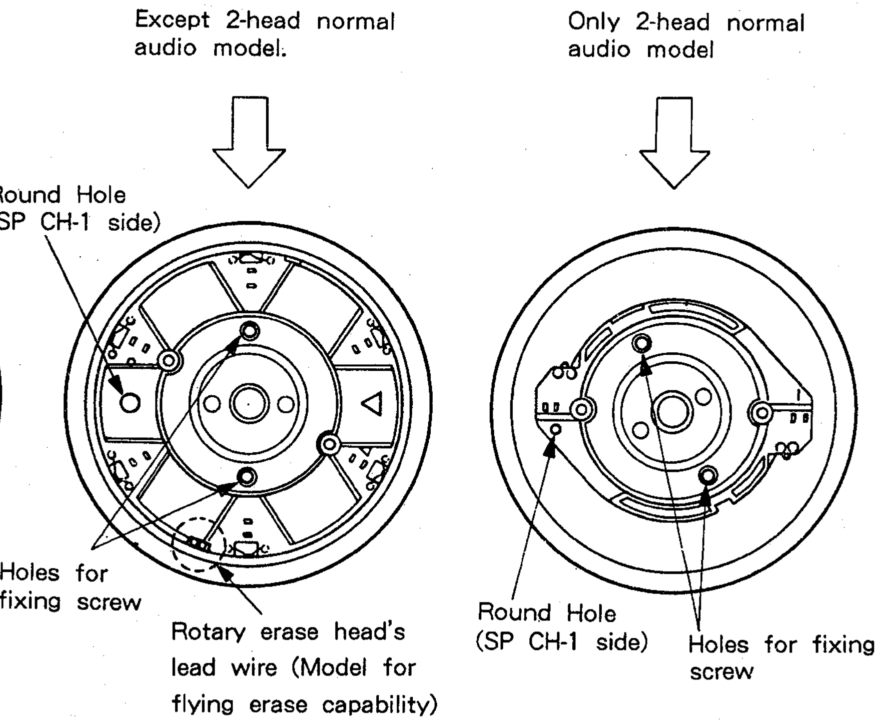
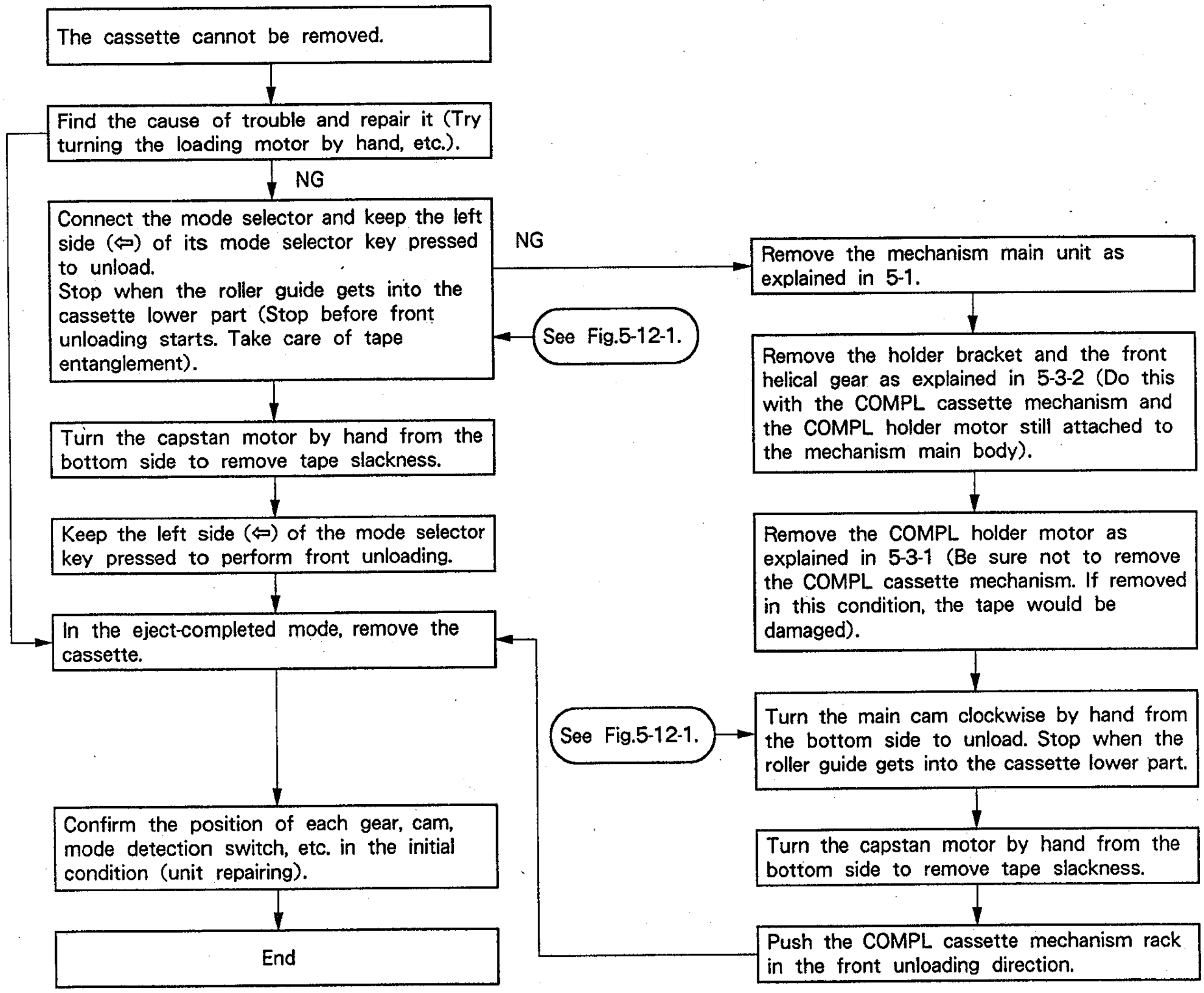

Except 2-head normal audio model.
Only 2-head normal audio model
Round Hole (SP CH-1 side)
Holes for fixing screw
Rotary erase head's lead wire (Model for flying erase capability)
Round Hole (SP CH-1 side)
Holes for fixing screw

Fig. 5-11-8. Lower Drum

5-12. HOW TO PROCEED WHEN THE CASSETTE CANNOT BE REMOVED


The cassette cannot be removed.

Find the cause of trouble and repair it (Try turning the loading motor by hand, etc.).

NG

Connect the mode selector and keep the left side (⇦) of its mode selector key pressed to unload.
Stop when the roller guide gets into the cassette lower part (Stop before front unloading starts. Take care of tape entanglement).

See Fig.5-12-1.

Turn the capstan motor by hand from the bottom side to remove tape slackness.

Keep the left side (⇦) of the mode selector key pressed to perform front unloading.

In the eject-completed mode, remove the cassette.

Confirm the position of each gear, cam, mode detection switch, etc. in the initial condition (unit repairing).

End

NG

Remove the mechanism main unit as explained in 5-1.

Remove the holder bracket and the front helical gear as explained in 5-3-2 (Do this with the COMPL cassette mechanism and the COMPL holder motor still attached to the mechanism main body).

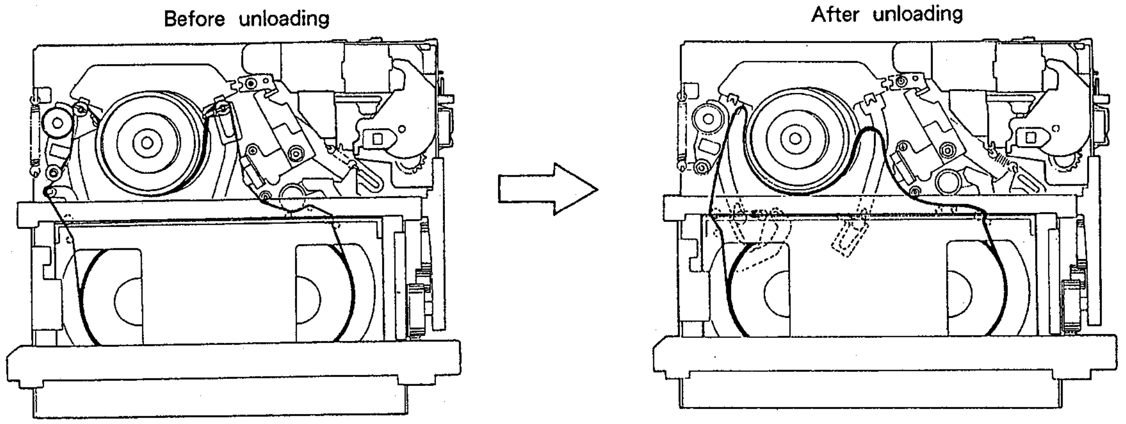
Remove the COMPL holder motor as explained in 5-3-1 (Be sure not to remove the COMPL cassette mechanism. If removed in this condition, the tape would be damaged).

See Fig.5-12-1.

Turn the main cam clockwise by hand from the bottom side to unload. Stop when the roller guide gets into the cassette lower part.

Turn the capstan motor by hand from the bottom side to remove tape slackness.

Push the COMPL cassette mechanism rack in the front unloading direction.


Before unloading

After unloading

Perform unloading using the mode selector.

First rotate the capstan motor by hand from the bottom to take-up the tape slack, and perform front-unloading using the mode selector.

Fig. 5-12-1

6. MECHANISM ADJUSTMENT

6-1. OPERATING THE MECHANISM WITH NO CASSETTE INSERTED (See Fig. 6-1-1.)

1) Attach black vinyl tape to the T. END and T. TOP sensors to prevent light from entering.
2) Push the TRAY LOCK LEVER in the direction of the arrow to maintain the unlocked condition. Release the lever just before the TRAY starts moving down.
3) In this condition, operation is possible in every mode. However, the following procedures are necessary to operate the unit in the REC, REW and R-SEARCH modes.

REC mode :	Push the SAFETY SW LEVER to turn the SAFETY SWITCH (Erasure Prevention Switch) ON, then press the REC button. If the SAFETY SWITCH is not turned ON, the unit will enter the EJECT mode.
REW/R-SEARCH :	After pressing the REW button, turn the TAKE-UP REEL ASS'Y by hand. Otherwise, the reel sensor will operate, setting the INITIAL mode after 2 to 3 seconds.

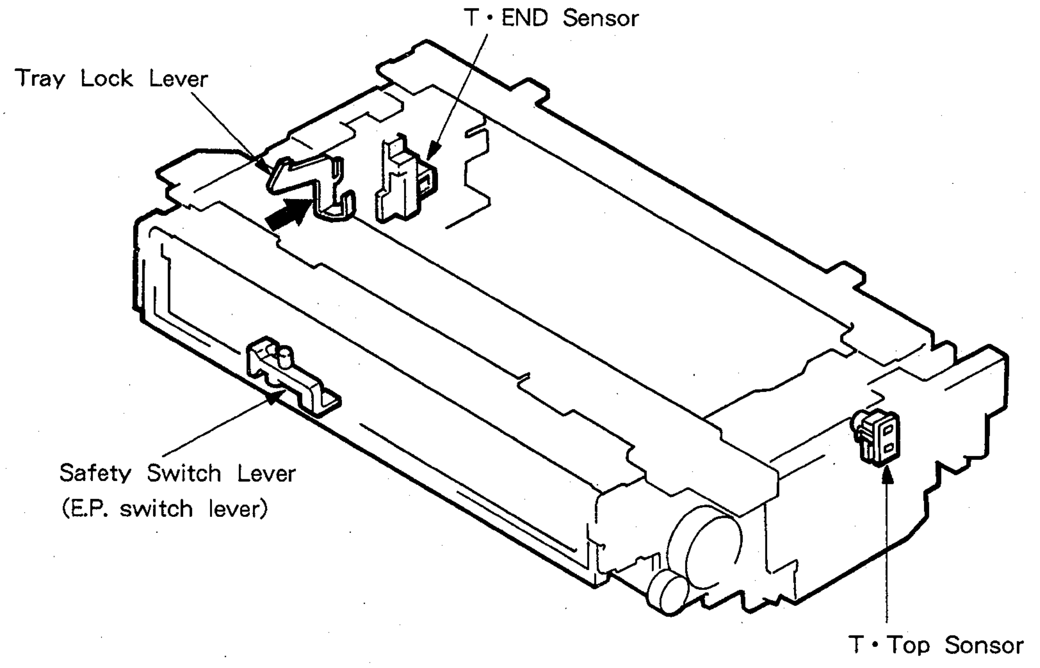


Fig. 6-1-1. Preparations for Adjustment

6-2. REEL TABLE HEIGHT ADJUSTMENT AND TORQUE CHECK

6-2-1. Reel Table Height (See Fig. 6-2-1.)

If the SUPPLY REEL ASS'Y or the TAKE-UP REEL ASS'Y is replaced, it will be necessary to adjust the REEL TABLE height.

(1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
(2) Attach the cassette stand plate gauge (VHJ-0001) and slide the gauge in the direction of the arrows.
(3) Confirm that, when the gauge stops, the REEL TABLEs are not in contact with surface A of the plate and are in contact with surface B.
(4) If the REEL TABLE is in contact with surface A, remove a spacer and check again.
(5) If the REEL TABLE is not in contact with surface B, add a spacer and check again.
(6) Remove the cassette stand plate gauge.
(7) Set the EJECT mode with the mode selector.
(8) Mount the COMPL CASSETTE MECHANISM as instructed in 5-2-1.

Note :

- Adjust the reel table height by adding or removing spacers (0.13t, 0.25t, 0.3t, 0.4t and 0.5t) as appropriate so that the height meets the specifications. Use the same method for both the TAKE-UP REEL TABLE and the SUPPLY REEL TABLE.
  (The 0.5t washer is included as the standard washer for the SUPPLY REEL ASS'Y. The 0.4t washer is included as the standard washer for the TAKE-UP REEL ASS'Y.)
- If the height of the reel table is not within the specified value, the tape edge might be damaged as a result, or the tape path adjustment might not be possible to make.

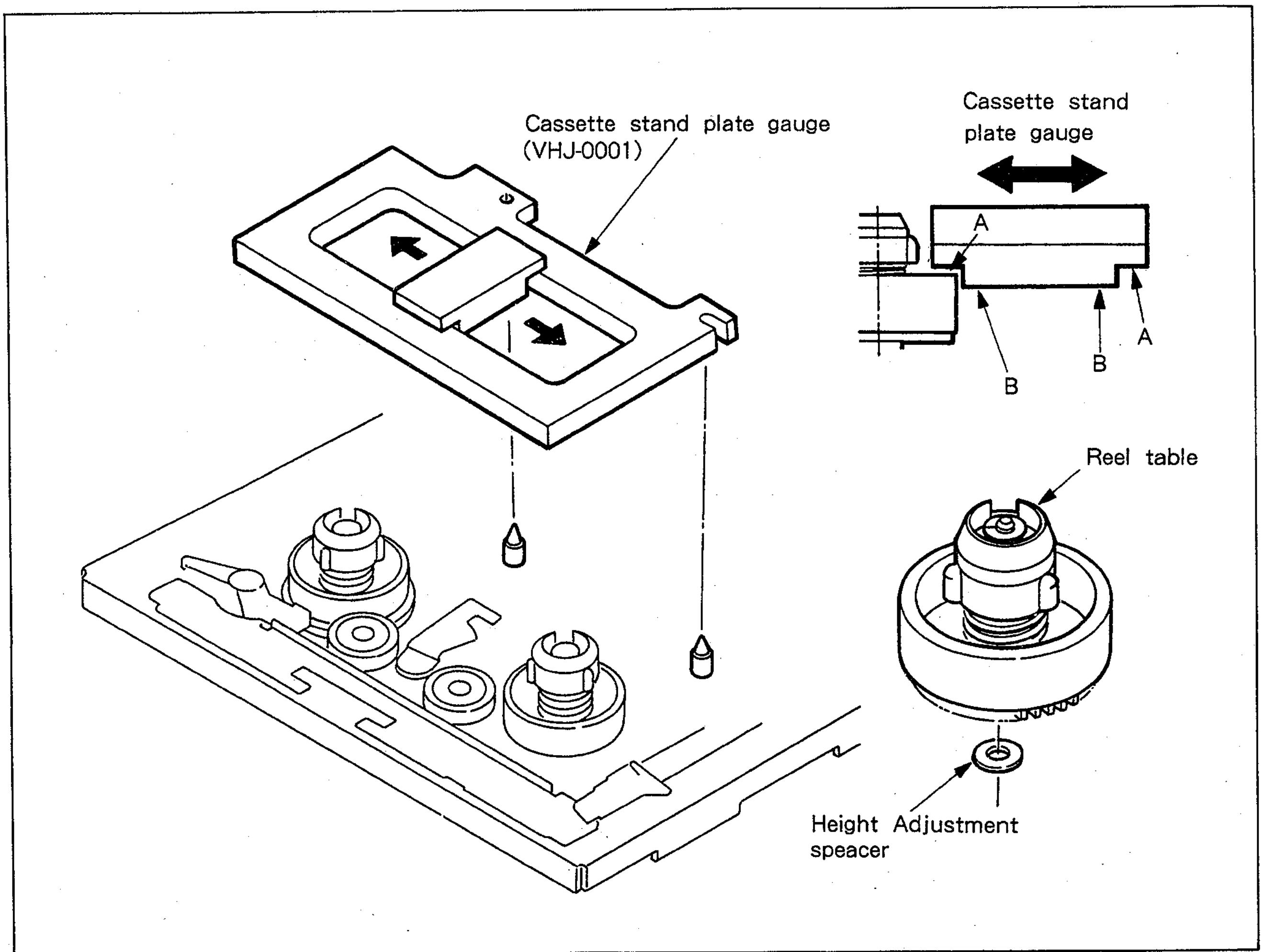


Fig. 6-2-1 . Reel Table Height Adjustment

6-2-2. Torque Check (See Fig. 6-2-2.)

1) Set the unit to operating condition without a cassette inserted as instructed in 6-1.
2) Measure the SUPPLY REEL TABLE torque in the REW mode, and confirm that it is 750gcm or more. Perform this measurement keeping the torque gauge in a fixed position with your hand (locked torque).
3) Measure the TAKE-UP REEL TABLE torque in the F.FWD mode, and confirm that it is 600gcm or more (locked torque).
4) Measure the TAKE-UP REEL TABLE torque in the playback mode (SP tape speed), and confirm that it is within 100 through 160gcm (locked torque).
5) Measure the SUPPLY REEL TABLE torque in the REV (F-SEARCH) mode, and confirm that it is within 150 through 240 gcm (locked torque).
6) After confirming that torque readings are within the specifications for each mode, check the following :
   ⓐ Dirt on the capstan motor and the REEL PULLEY groove.
   ⓑ Deterioration of the REEL DRIVE BELT.
   ⓒ Deterioration of the FRICTION GEAR ASS'Y felt (torque during playback).
   ⓓ Wear and damage of the COMPL CLUTCH MECHANISM and the reel drive system gears.

Note1 : Items ⓑ, ⓒ and ⓓ require replacement if found defective.

Note2 : The measured value of torque during FF and REW represents the value 2 seconds after starting.

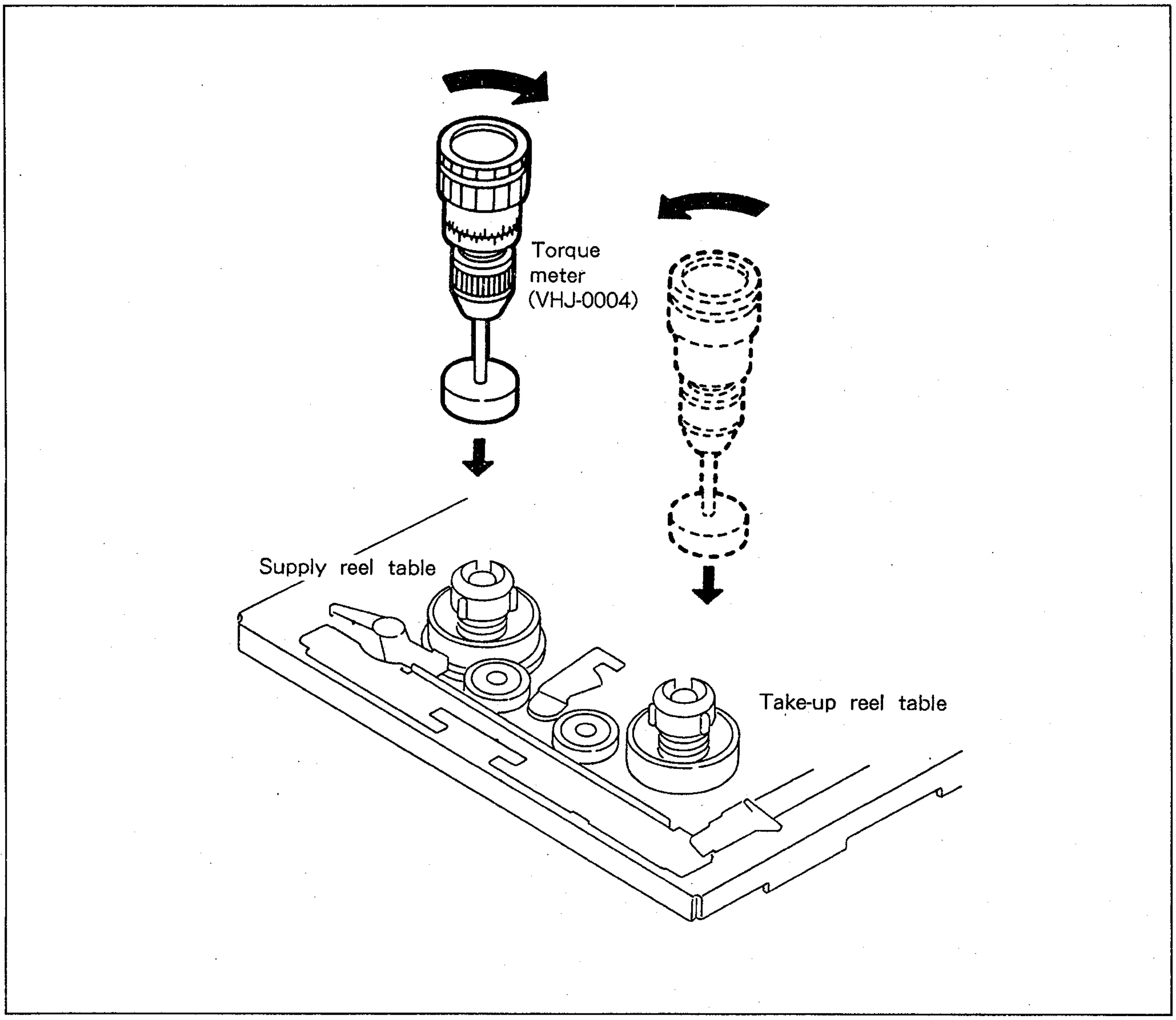


Fig. 6-2-2 Checking REW/FF/PLAY Torque

6-3. TENSION POLE (BACK TENSION GUIDE) POSITION ADJUSTMENT AND BACK TENSION TORQUE CHECK

6-3-1. Tension Pole (Back Tension Guide) Position Adjustment (See Fig. 6-3-1.)

1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
2) Set the PLAY mode with the mode selector (VHJ-0050).
3) Attach the position adjustment gauge (VHJ-0049) ①.
4) Confirm that the tension pole ② is within the position adjustment gauge frame.
5) In case the tension pole is not within the above-mentioned frame, adjust it by loosening the screw ④ a little and changing the mounting position of the BAND HOLDER ⑤ in the direction of the arrow Ⓐ.
6) Remove the position adjustment gauge ①.
7) Set the EJECT mode with the mode selector.
8) Mount the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
9) Confirm that back tension torque is within 50 ± 10gcm, as instructed in 6-3-2 below.

6-3-2. Back Tension Torque Check (See Fig. 6-3-1.)

1) Attach the cassette torquemeter (VHJ-0016) and set the PLAY mode.
2) Confirm that back tension torque is within 47 ± 5gcm.
3) In case back tension torque does not meet the above specification, proceed as follows:

ⓐ Clean the portion where the brake band (BAND HOLDER ASS'Y) ⑦ of the SUPPLY REEL ASS'Y ⑥ makes contact.

ⓑ Confirm that the brake band of the BAND HOLDER ASS'Y ⑦ does not make wear and that it is clean. If wear or dirt is found, replace the band holder assembly ⑦ as instructed in 5-7-3.

ⓒ Replace the TENSION LEVER ASS'Y SPRING COIL ⑧.

Note : Always follow procedures in 6-3-1. Tension Pole Position Adjustment after performing ⓐ, ⓑ and ⓒ.

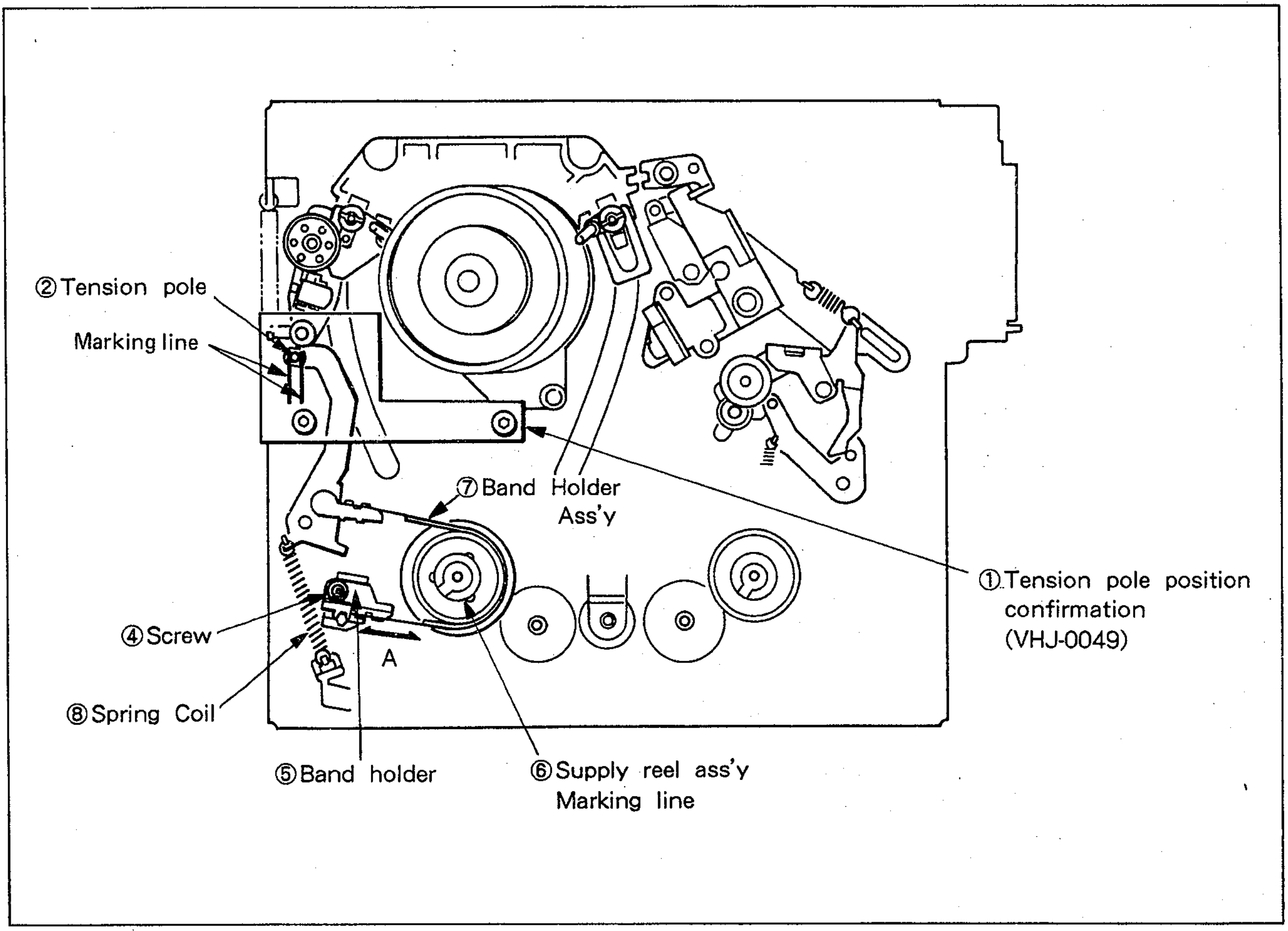


Fig. 6-3-1. Tension Pole Positioning Adjustment

6-4. TAPE PATH ADJUSTMENT

The tape path mechanism is precisely adjusted at the factory. Normally no readjustment is required, but checking and/or adjustment is necessary when parts of the tape path mechanism among those shown in the figure below (See Fig. 6-4-1.) have been removed or replaced after a long period of use.
This operation consists of adjusting the various guides so that the tape drawn out from the supply reel runs smoothly along the DRUM (CYLINDER) lead surface. A way of grasping the tape path condition by electronic means is monitoring the video head output envelope waveform with an oscilloscope. However, the fact that visual observation is essential in order to know whether the tape is running through the various guides in a smooth and natural way should be kept in mind when checking and adjusting.
Also remember that the position of tape guides is not greatly affected by the replacement of the UPPER DRUM (UPPER CYLINDER) or the COMPL DRUM (COMPL CYLINDER), provided that it is correctly performed, and that only the replaced parts should be adjusted after replacing a tape guide or COMPL HEAD BRACKET, since the position of the other tape guides shall not change considerably.

6-4-1. Preparations for Adjustment

(1) Clean the tape transport surfaces (See Fig. 6-4-1.).

(2) Connect the oscilloscope. Connect the channel 1 probe to the envelope waveform test point, and the channel 2 probe to the SW30 (RF SW P) test point. During adjustment, apply a trigger to the low side of the SW30 (RF SW P) in order to monitor the waveform output from channel 1 of the video head.

Note : Since oscilloscope connection points differ according to the model, refer to the "Test Point for Tape Path Adjustment" allocation figure in the electric circuit adjustment section of the service manual book.

(3) Use a dentist's mirror for visual observation of tape path condition.

(4) Use a nut box (VHJ-0048) for adjustment of the fixed guides.

(5) Use an eccentric driver (VHJ-0003) for adjustment of the guide rollers.

(6) When adjusting height of the fixed guide, guide rollers or COMPL head bracket, turn the special nut or the upper flange clockwise to push the tape downward, and counterclockwise to make the tape rise up.

(7) Do not use the damaged cassette tapes for tape path adjustment.

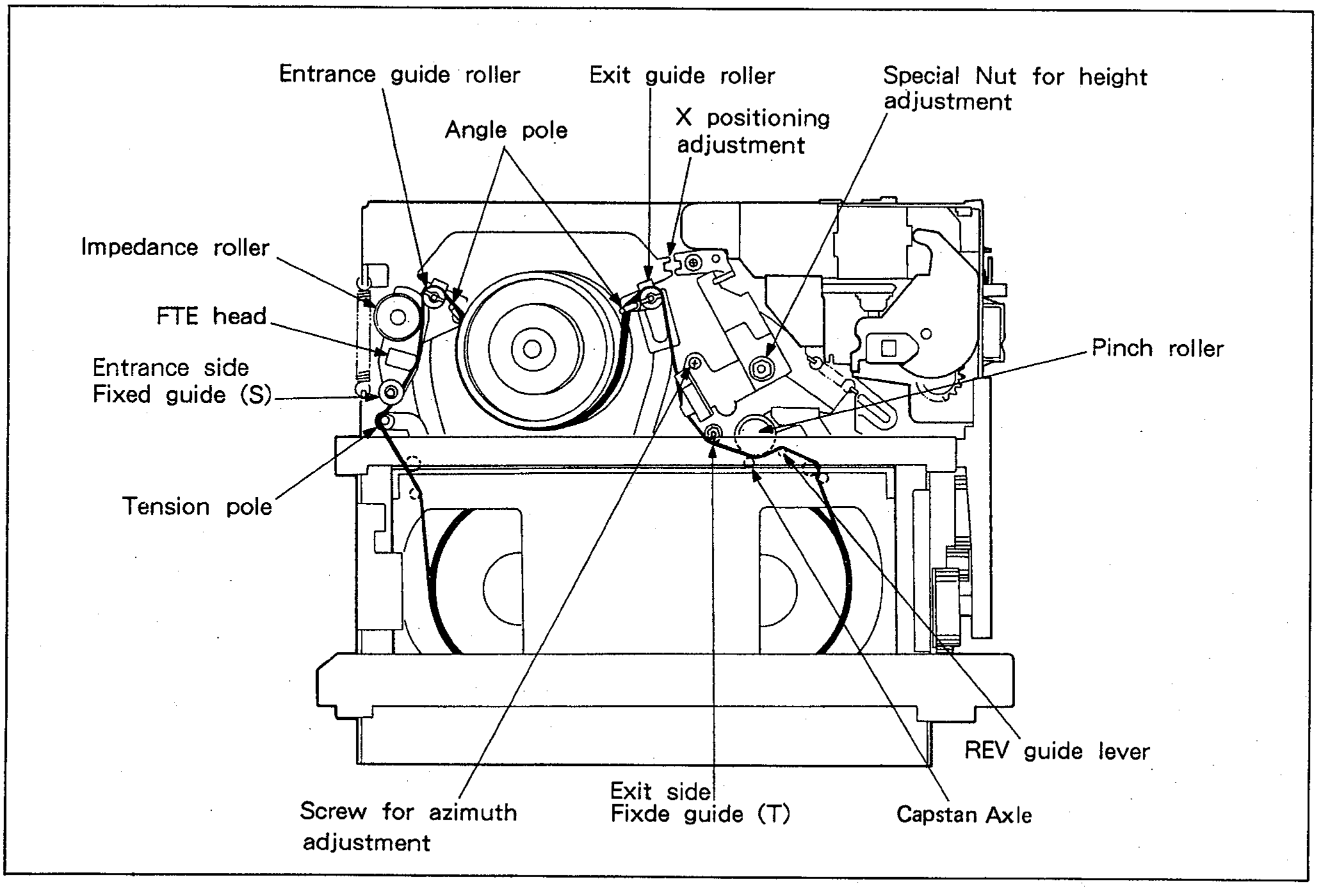

Entrance guide roller
Exit guide roller
Special Nut for height adjustment
Angle pole
X positioning adjustment
Impedance roller
FTE head
Entrance side Fixed guide (S)
Pinch roller
Tension pole
REV guide lever
Screw for azimuth adjustment
Exit side Fixde guide (T)
Capstan Axle

Fig. 6-4-1. Preparation for Adjustment

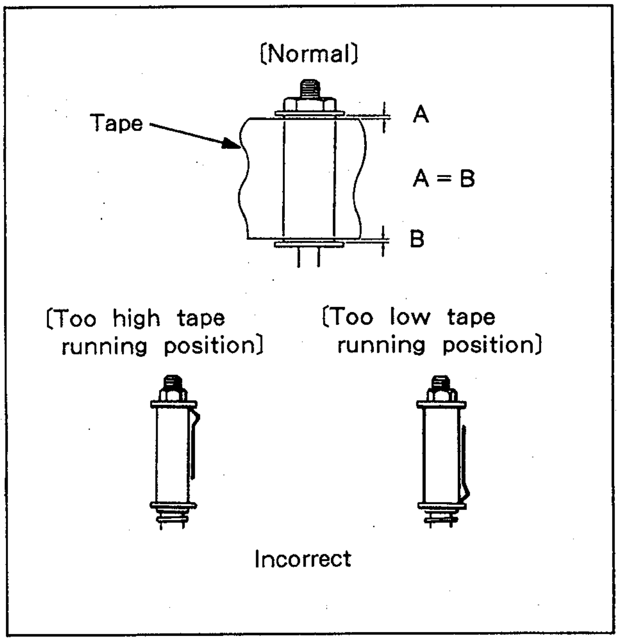
6-4-2. Adjustment by Visual Observation after Guide Roller, Fixed Guide or COMPL Head Bracket Replacement

Perform this adjustment after removing or replacing any of the above parts. Only for the replaced or removed parts, play back an alignment tape (VHJ-0009) beforehand and adjust height by visual observation.

(1) Exit Side Fixed Guide (See Fig. 6-4-2.)
Adjust so that the tape upper edge does not make contact with the fixed guide upper flange, and the tape lower edge does not make contact with the fixed guide lower flange. Gaps A and B should remain equal.

(2) Guide Rollers (See Fig. 6-4-3.)
The tape should not be curled by the guide roller upper and lower flanges. It should also run smoothly, without moving up and down on the DRUM (CYLINDER) lead surface.

Note : An excessive guide roller pressure may cause tape damage.


[Normal]
Tape
A
A = B
B
[Too high tape running position]
[Too low tape running position]
Incorrect

6-4-2. (1) Pre-set For Exit Side Fixed Guide

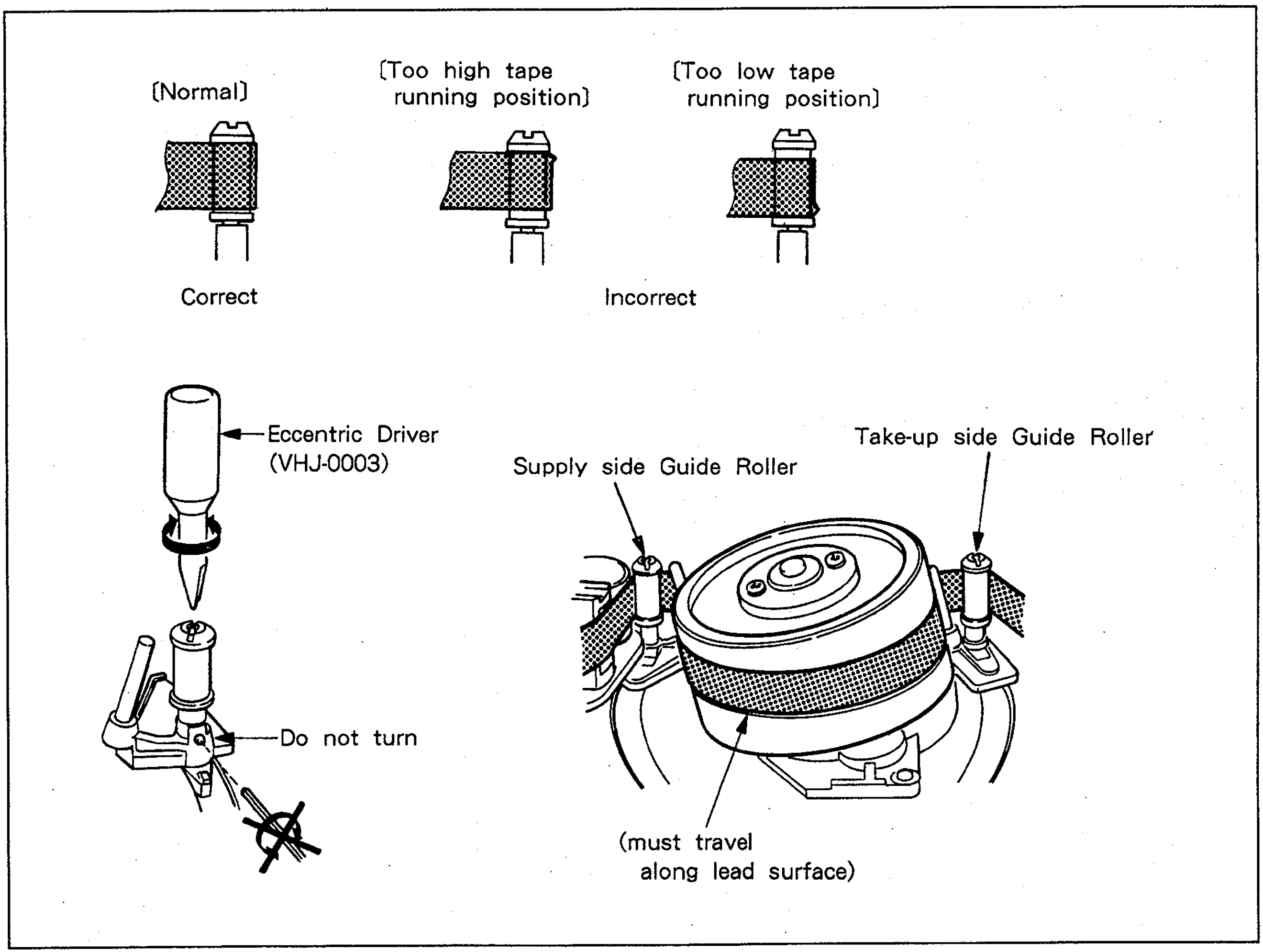

[Normal]
[Too high tape running position]
[Too low tape running position]
Correct
Incorrect
Eccentric Driver (VHJ-0003)
Do not turn
Supply side Guide Roller
Take-up side Guide Roller
(must travel along lead surface)

Fig. 6-4-3. (2) Pre-set for Guide Roller

(3) COMPL Head Bracket (ACE Head) (See Fig. 6-4-4.)
Adjust the special nut so that the tape edge runs between the audio head upper end and the control head lower end. Gaps A and B should be of about the same width. Since at this point it is only required that the control signal is picked up and the servo circuit works normally, no adjusting screws except the COMPL head bracket special nut should be touched.

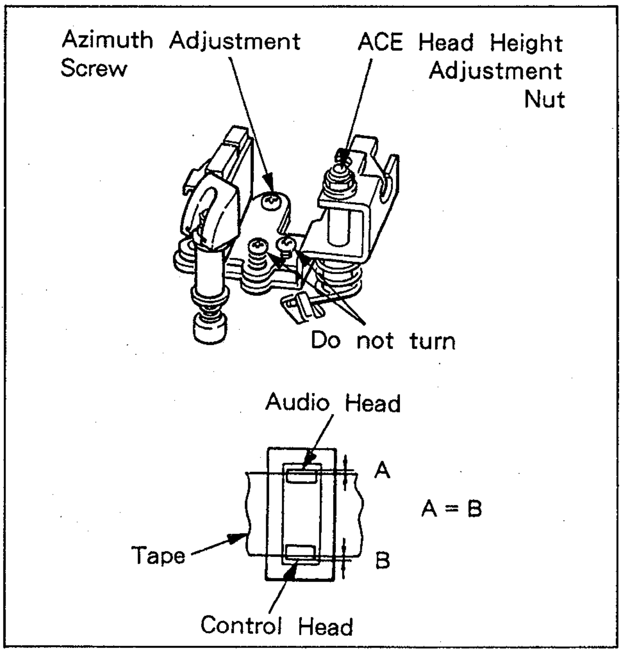

Azimuth Adjustment Screw
ACE Head Height Adjustment Nut
Do not turn
Audio Head
A
A = B
Tape
B
Control Head

Fig. 6-4-4. (3) Pre-set for Compl Head Bracket

6-4-3. Entrance Side Fixed Guide (S) Height Adjustment (See Fig. 6-4-5.)

The P90 mechanism entrance side fixed guide comes in two types ; the one in this unit is equipped with an upper flange and a spring coil, and it requires height adjustment. The other type is not provided with an upper flange and a spring coil. Height is naturally set when the special nut is fastened, so adjustment is not required.
For units with an upper flange, perform height adjustment as explained below. Even for types which do not require height adjustment, check whether the lower tape edge runs along the lower flange. Be careful not to fasten the special nut excessively, causing the axle to run idle.

1) Rotate the fixed guide (S) counterclockwise to lift the tape somewhat, then insert the fixed guide height gage (VHJ-0053) into the lower side of the fixed guide (S) lower flange.
2) Rotate the fixed guide (S) special nut clockwise a little at a time until the lower flange makes contact with the upper surface of the fixed guide height gage, causing a slight drag.
3) After rotating the special nut 90° counterclockwise, remove the Axed guide height gauge.
4) After adjusting the guide rollers in section 5-4-4, play back the alignment tape (VHJ-0009). Confirm that the tape lower edge runs in close contact with the fixed guide (S) lower flange. In case too much pressure has left a gap between the tape and the lower flange, or excessive lifting has caused curling of the tape lower edge, perform fine adjustment. However, do not adjust the special nut beyond 90° clockwise and 45° counterclockwise.

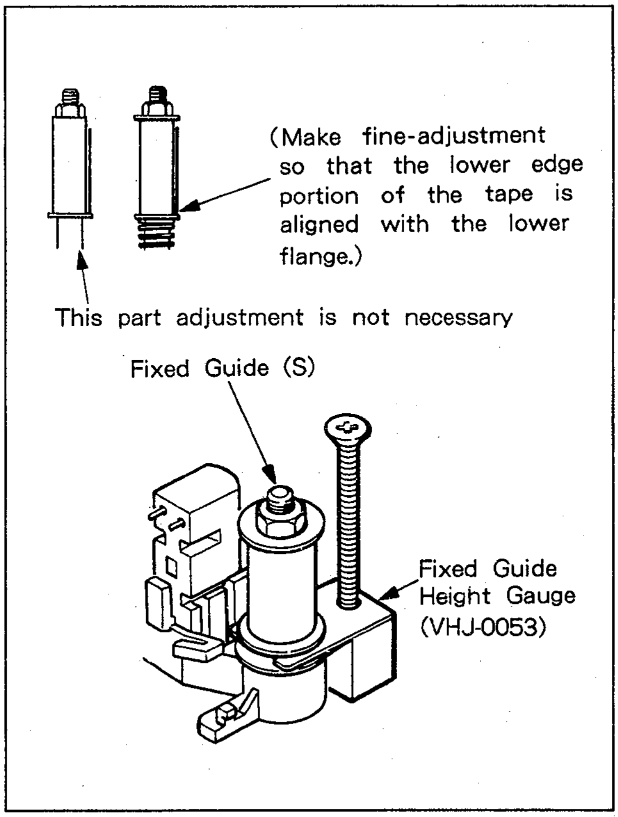

(Make fine-adjustment so that the lower edge portion of the tape is aligned with the lower flange.)
This part adjustment is not necessary
Fixed Guide (S)
Fixed Guide Height Gauge (VHJ-0053)

Fig. 6-4-5. Entrance Side Fixed Guides

6-4-4. Guide Roller Adjustment (See Fig. 6-4-6.)

1) Play back the alignment tape (VHJ-0009), press the tracking control key and adjust the envelope waveform to the maximum level.
2) Loosen the entrance and exit guide rollers by rotating them counterclockwise, then rotate them clockwise alternately until they are fastened and a flat video output waveform is obtained.
3) Confirm that the envelope waveform is not deformed, and check visually that no curling occurs at the guide roller upper and lower flanges.
4) Press the tracking control key and set the envelope waveform level to approx. 50% of the maximum. In this condition, confirm whether the envelope waveform is flat. It will not, showing valleys or peaks at the first half (entrance) or second half (exit), if the guide roller pressure is excessive or insufficient.
   In case there is unevenness in the first half (entrance), adjust the entrance side guide roller. If the second half (exit) shows trouble, adjust finely the exit side guide roller.

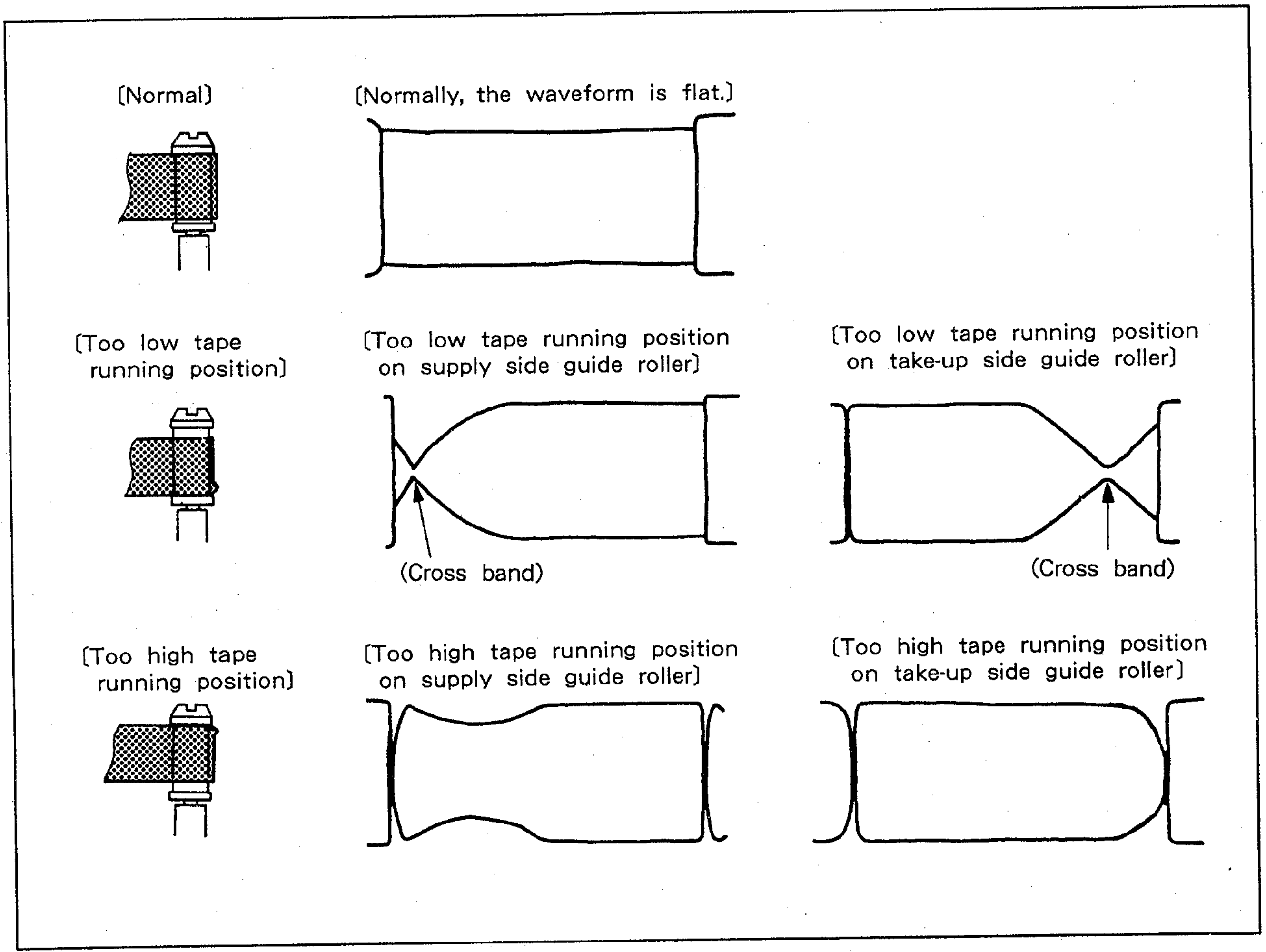

[Normal]
[Normally, the waveform is flat.]
[Too low tape running position]
[Too low tape running position on supply side guide roller]
(Cross band)
[Too low tape running position on take-up side guide roller]
(Cross band)
[Too high tape running position]
[Too high tape running position on supply side guide roller]
[Too high tape running position on take-up side guide roller]

Fig. 6-4-6. **Guide Roller Adjustment**

6-4-5. Exit Side Fixed Guide (T) Adjustment (See Fig. 6-4-7.)

1) Load the alignment tape (VHJ-0009) and set the PLAY mode.
2) Rotate the special nut counterclockwise so that the lower flange lifts the tape until its lower edge is slightly curled.
3) Rotate the special nut clockwise a little at a time until curling of the tape lower edge is removed.
4) Confirm at each mode (PLAY, F.SEARCH, R. SEARCH, F.F and REW) that the tape runs along the lower flange and that no curling occurs.

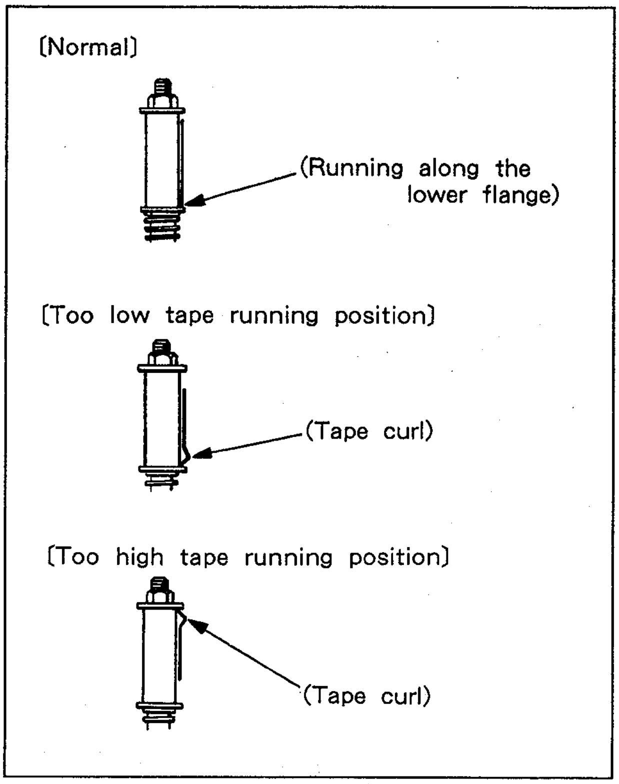

[Normal]
(Running along the lower flange)
[Too low tape running position]
(Tape curl)
[Too high tape running position]
(Tape curl)

Fig. 6-4-7. Fixed Guide (T)

6-4-6. COMPL Head Bracket (ACE Head) Adjustment

(1) Height Adjustment and Azimuth Adjustment (See Fig. 6-4-8.)

1) Load the alignment tape (VHJ-0009) and set the PLAY mode.
2) Monitor the audio output waveform with the oscilloscope.
3) Rotate the azimuth adjustment screw until the audio output waveform amplitude is maximum.
4) After loosening the ACE head height adjustment special nut, rotate it slowly clockwise until amplitude of the audio output waveform is maximum, then adjust it finely clockwise to the point just before the said waveform amplitude begins to decrease.
5) Rotate the azimuth adjustment screw until amplitude of the audio output waveform is maximum.
6) Confirm that the audio output waveform amplitude does not fluctuate.

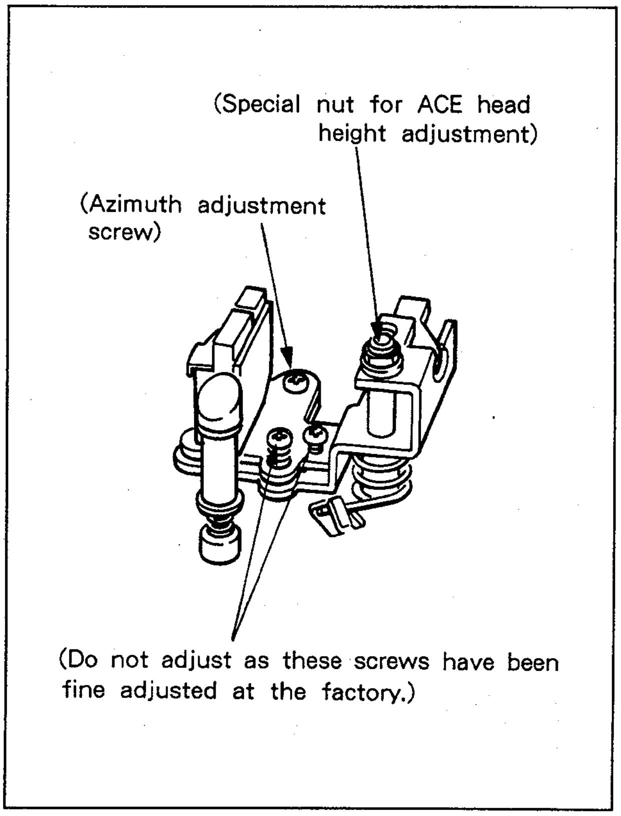

(Special nut for ACE head height adjustment)
(Azimuth adjustment screw)
(Do not adjust as these screws have been fine adjusted at the factory.)

Fig. 6-4-8. Compl Head Bracket

(2) Tracking (X Value) Adjustment (See Fig. 6-4-9.)

1) Load the alignment tape (VHJ-0009) and set the PLAY mode.
2) Set tracking to the center position with the tracking control key (See Note below).
3) Rotate the stopper bracket fixing screw 180° counterclockwise.
4) Monitor the video head output envelope waveform with the oscilloscope.
5) Adjust the stopper bracket position so that amplitude of the envelope waveform becomes maximum at the tracking center and the envelope waveform amplitude changes by the same amount when shifting the tracking center by pressing the plus (+) and minus (−) tracking control keys.
6) Tighten the fixing screw.
7) (Model for LP mode tape speed capability)
Playback the alignment tape (VHJ-0052) and set the tracking to the center using a tracking control key.
Then confirm that the playback picture on screen is normal. If not, Make readjustment by referring to items 1) through 7). To readjust, playback VHJ-0009 and finely adjust the position of the stopper bracket within the range in which the amplitude of the envelope waveform can be held to a maximum.
8) Perform servo circuit PB PHASE (Switching position) adjustment.

Note: For models equipped with auto tracking, always set to the manual tracking mode before adjustment. To confirm the tracking center position, press the tracking keys (+, −) and observe the front panel clock display. It will read "T − : −" at the tracking center, "T − : , T − − : " when keeping the minus (−) key pressed, and "T : −, T : − −" when keeping the plus (+) key pressed. The time indication will be restored 2 to 3 seconds after the tracking keys are released.

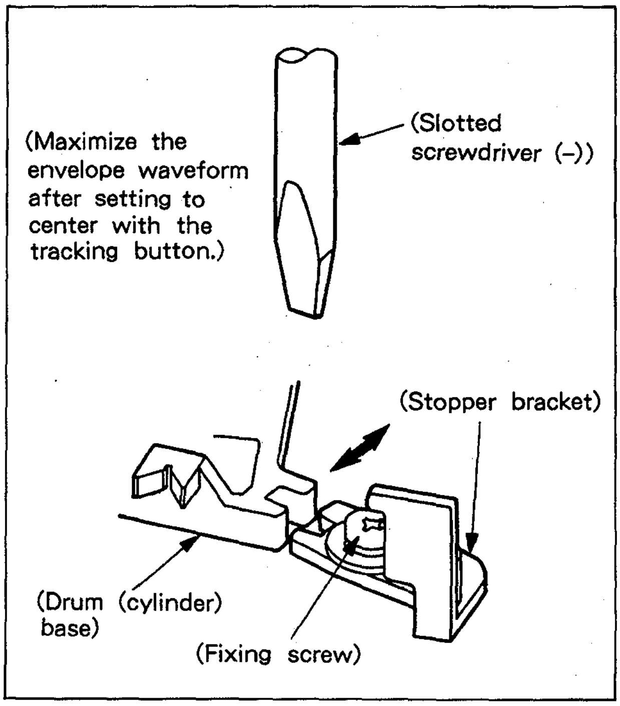

(Maximize the envelope waveform after setting to center with the tracking button.)
(Slotted screwdriver (-))
(Stopper bracket)
(Drum (cylinder) base)
(Fixing screw)

Fig. 6-4-9

6-4-7. Checking after Adjustment

Tape running may show a slight change depending upon the type of the cassette tape (thick or thin tape), the start, middle, or end of cassette tape winding, etc. After performing the tape path adjustment with use of an alignment tape, be sure to check the following points. Incidentally, the alignment tape to be used should be E-180 or E-240 cassette should be a good one without any damage to it.

(1) Try to play back the alignment tape (VHJ-0009) and confirm that the envelope waveform rise immediately and that there is no fluctuation in the envelope waveform and the audio output waveform.

(2) Load a cassette tape E-180 and start recording operation in the standard mode. 1 kHz should be fed to the audio input terminal when recording. After recording, the following points should be checked.

1. When the recorded portion is played back, the envelope waveform rise immediately, and no fluctuation in the envelope waveform is observed. Also, no speed drop occurs during the first half period or the last half period. Further, check to be sure that no fluctuation occurs in the audio waveform. Also confirm that neither the tape curling or derailing is caused on the upper or lower flange and the on the read side of the drum.
2. Confirm that no tape curling or derailing occurs in the upper or lower flange of each tape guide and the read side of the drum during each mode of operation, namely, FF, REW, F. SEARCH, and R. SEARCH.
3. Confirm that the envelope waveform rise immediately after changing the mode directly to the PLAY from each mode of FF, REW, F. SEARCH, R. SEARCH, or POWER OFF (INITIAL) and that no tape curling or derailing occurs in the upper or lower flange of the each tape guide and on the read side of the drum.

(3) Load a E-240 cassette tape and perform recording operation in the SP mode. 1 kHz should be fed to the audio input terminal when recording. Now, confirm that the envelope waveform rise immediately upon starting the playback of the recorded portion, and that neither fluctuation in the envelope waveform nor a speed drop occurs during the first half period or the last half period. Also confirm that no tape curling or derailing is caused in the upper or lower flange of each tape guide and on the drum lead surface.

(4) Perform recording for 60 seconds in the SP mode at the start of E-240 cassette winding. Play back the recorded portion and repeat the F.SEARCH ↔ R.SEARCH ten times, following which confirm that no damage is done to the tape edge. If any damage is found on the tape edge, a proper step must be taken as below depending upon the symptom obserbed.

1. When a sawtooth shaped damage is caused on underside of the tape edge by the REV guide
   1) Check to see if damage is done to the tape by the REV guide.
   2) Loosen the tilt adjustment screw of the ACE head bracket by turning it 135° counterclockwise.
   3) Make readjustment of the exit side fixing guide by referring to item 6-4-5.
   4) Make readjustment of the ACE head bracket (azimuth, height and adjustment of X value) by referring to item 6-4-6.
   5) Confirm that no fluctuation in the audio level is caused by loosening the tilt adjustment screw in steps 1) and 2) above. Move the screw a little back if any fluctuation is found (but never move it back to the original position). After adjusting the tilt adjustment screw is readjusted, perform steps 3) and 4) once again.
   6) Confirm again that the E-240 cassette tape does not sustain any damage.
   7) Perform the recording and playback on the E-180 and E-240 cassette tape and confirm that no fluctuation occurs in the envelope waveform and the audio waveform.

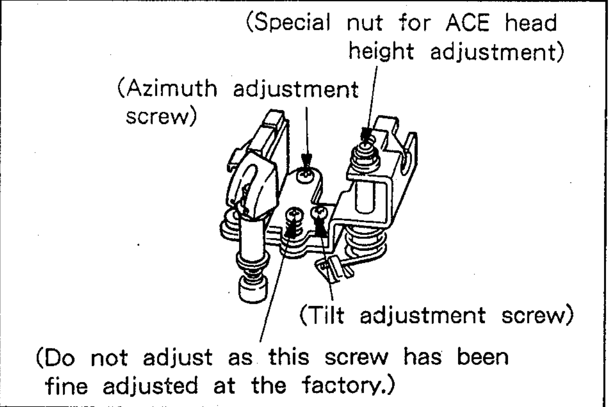

(Special nut for ACE head height adjustment)
(Azimuth adjustment screw)
(Tilt adjustment screw)
(Do not adjust as this screw has been fine adjusted at the factory.)

Fig. 6-4-10 Compl Head Bracket

2. If damage in the form of a sawtooth or a streak is found on the tape edge
   1) Check if a large amount of magnetic particles is adhered to the exit-side guide roller. If magnetic particles cannot be removed in spite of repeated cleaning, the guide roller must be replaced.
   2) Confirm if the tape is held too tightly by the exit-side guide roller, or if the last half of the envelope waveform is flat. If the type is found held too tightly, readjustment should be made by referring to 6-4-4.
   3) Recheck if the damage is still caused on the E-240 tape.
      If similar damage is still found on the tape, the exit-side guide roller should be loosened about 20° counterclockwise.
   4) Check once again that no fluctuation is caused in the envelope waveform or the audio waveform by loosening the exit-side guide roller. To do this, record and play back the E-240 cassette tape.

(5) Perform recording for 60 seconds in the SP mode at the near end of the E-240 cassette tape. Play back the recorded portion and repeat the F. SEARCH ↔ R. SEARCH ten times, following which a check should be made to see if damage is still done to the tape edge. If a damage in the form of a sawtooth or a streak is still occurred on the tape edge by the upper lounge of entrance side guide roller, proceed with the step given below.
   1) Check if a large amount of magnetic particles is adhered to the entrance-side guide roller. If the magnetic particles cannot be removed in spite of repeated cleaning, the guide roller must be replaced with new one.
   2) Confirm if the tape is held too tightly by the entrance-side guide roller, or if the first half of the envelope waveform is flat. If the tape is found held too tightly, readjustment should be made by referring to 6-4-4.
   3) Recheck if the damage is still caused on the E-240 tape.
      If the damage is still found on the tape, the entrance-sideguide roller should be loosened aboud 20° counterclockwise.
   4) Check once again that no fluctuation is caused in the envelop waveform or the audio waveform by looseving the entrance-side guide roller. To do this, record and play back the E-240 cassette tape.

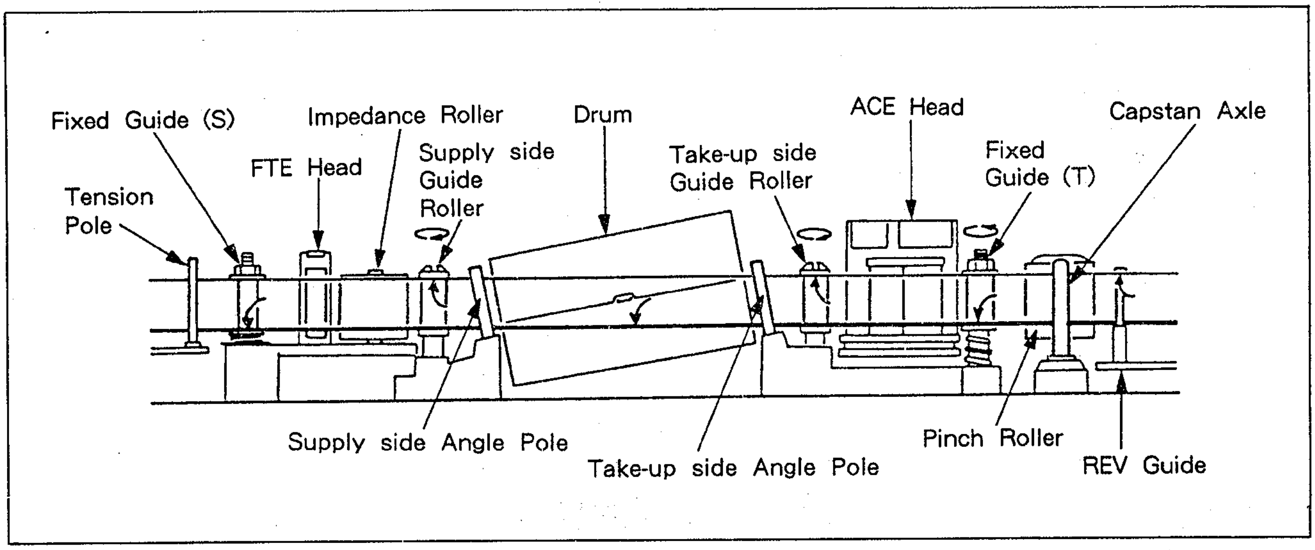


Fig. 6-4-11.

MEMO

SANYO

SANYO Electric Co., Ltd.
Osaka, Japan

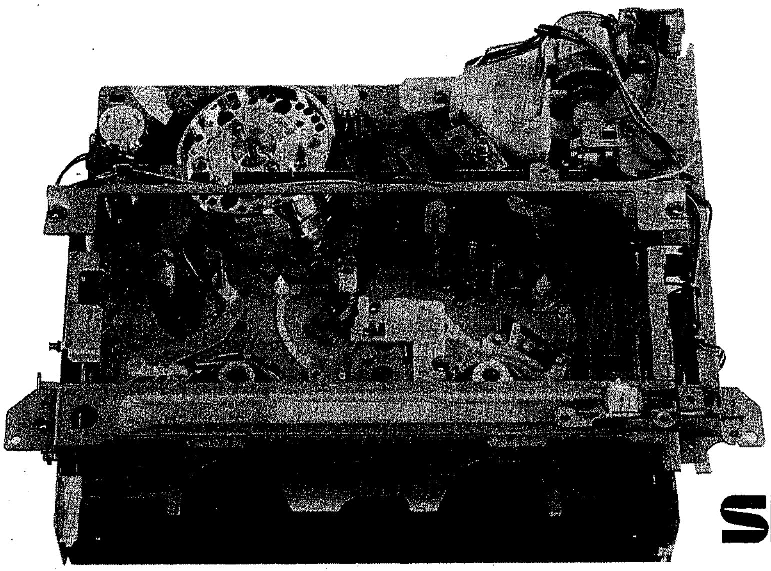
Apr./'90/7500 SU

SANYO

P-90 S VHS Mechanism

Supplement
Service Technical
Information

Colour Video
Cassette Recorder



S VHS 625 VHS PAL

Use this supplement together with the P-90 Mechanism Manual (WM-530599) of the Service Technical Information published in 1990.

CONTENTS

1. Outline of P-90 S VHS Mechanism ······························· 2
2. Sections Changed from P-90 Mechanism Issued in 1990 ········· 4
    - 2-2. Description of Mechanism Drive ······························· 4
    - 5-1. Mechanism Main Unit········· 6
    - 5-2. Cassette Holder Mechanism······················· 7
    - 5-10. Fixed Guide, FE Head Lever Ass'y······················· 10

1. OUTLINE OF P-90 S VHS MECHANISM

The reel drive system of P-90 S VHS mechanism has been newly developed based upon the P-90 mechanism. As for the mechanism composition other than reel drive system is the same as P-90 mechanism. Since only the different sections from P-90 mechanism are described in this manual, use the P-90 Mechanism Manual (Mechanism Service Technical Information) published in 1990 as well. P-90 S VHS is featured as follows;

1) Brass impedance rollers of large diameter at head drum entrance and small diameter at exit are employed in order to reduce jitter component of tape path system and to obtain the stable picture.

2) The mode transition time as shown in Fig. 1-1 is reduced, comparing with P-90 mechanism. The tape rewind time is largely reduced by FF/REW high-speed. Therefore, the following points are taken into consideration in P-90 S VHS.

	P-90 MECHANISM	P-90 S VHS MECHANISM
STOP → PLAY	1.5"	1.3"
CASSETTE IN	4.9"	4.4"
POWER OFF → PLAY	4.1"	3.6"
FF/REW REWIND TIME (E-180)	4'	2'40"

Table 1-1. Mode Transition Time Comparison

① Noise reduction by large driven gear
In order to reduce the noise of reel drive system in FF/REW modes, the large driven gear is employed so that proper contact ratio is obtained. A driving force between gears can be smoothly transmitted by using large gear, therefore the noise at gear engagement can be reduced.

② Change of deceleration ratio in FF/REW modes
In order to reduce the capstan motor noise, the reel pulley diameter has been changed and drive deceleration ratio is reduced as possible.

③ Brake mechanism improvement
During taking-up the tape at high-speed in FF/REW modes, if sudden brake is applied, a high tape tension is generated and the tape will be damaged by rotary head, etc. Therefore, the brake mechanism components have been improved to apply brake softly, so that the brake operation is stabilized.

④ Capstan motor control
In order to operate FF and REW modes in higher-speed, a capstan motor used as a reel driving source is newly developed to upgrade the revolutions. However, only by upgrading the revolutions, VISS signal dropout, etc. caused by tape defects and slacks can not be prevented.
And when the tape is rewound in high-speed even at the end of tape rewinding, the leader tape portion is also rewound before the tape end sensor detects and the brake is applied, thus the tape will be damaged.
In order to prevent this, the capstan motor is designed to start smoothly at the start of FF/REW modes. And the tape remaining amount detector is used to detect the specified amount (E-60:2 mm, E-180:3.6 mm) at high-speed rewind, and as soon as it reaches the specified amount, the capstan motor deceleration starts. Also in decelerating mode, a smooth deceleration is performed not to cause any tape slacks. (Refer to 1-1.)

⑤ In order to prevent the noise caused by operating at high-speed in FF/REW modes, the guide roller at drum entrance is renewed .

3) A detection switch to enable automatic discrimination of S VHS cassette tape is added.
(Same type as conventional S VHS model)

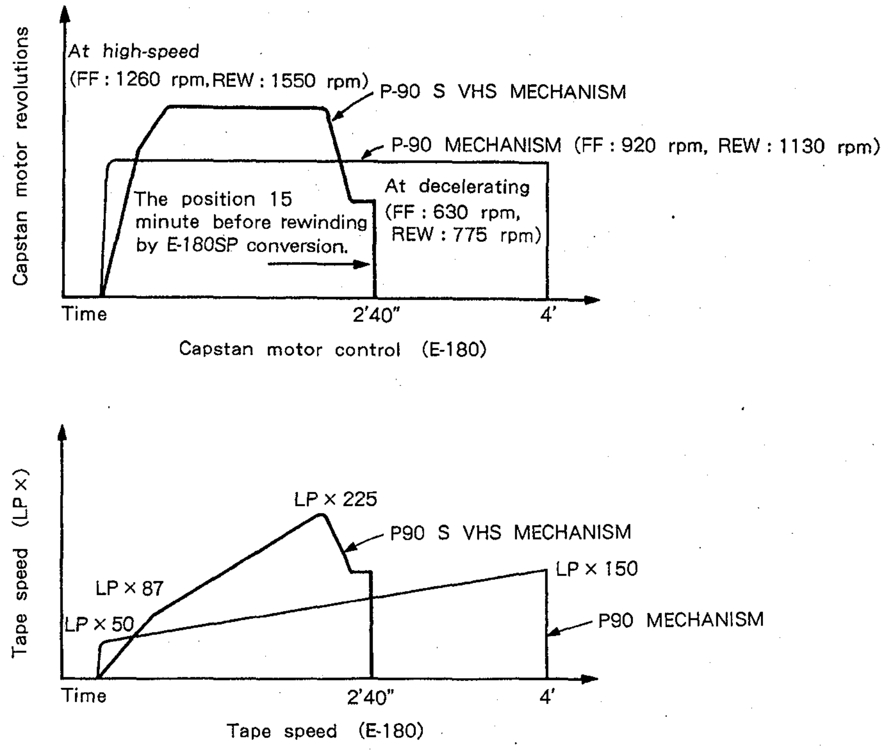
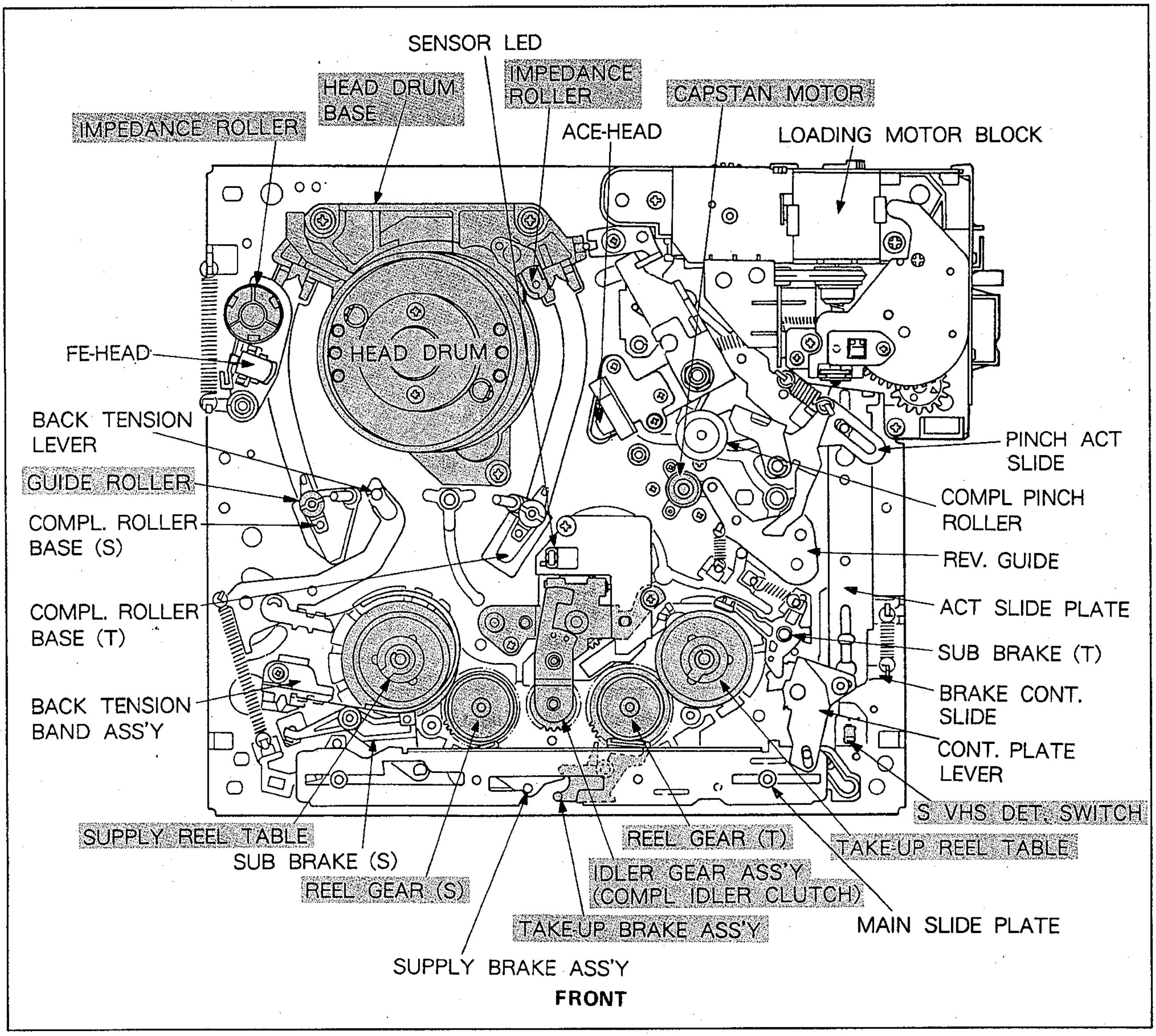


Fig. 1-1. Comparison of Conventional Mechanism and P-90 S VHS Mechanism

2. SECTIONS CHANGED FROM P90 MECHANISM ISSUED IN 1990

2-2. DESCRIPTION OF MECHANISM DRIVE

The shaded sections are different from P-90 MECHANISM.



SENSOR LED
HEAD DRUM BASE
IMPEDANCE ROLLER
IMPEDANCE ROLLER
CAPSTAN MOTOR
ACE-HEAD
LOADING MOTOR BLOCK
HEAD DRUM
FE-HEAD
BACK TENSION LEVER
GUIDE ROLLER
COMPL. ROLLER BASE (S)
COMPL. ROLLER BASE (T)
BACK TENSION BAND ASS'Y
PINCH ACT SLIDE
COMPL PINCH ROLLER
REV. GUIDE
ACT SLIDE PLATE
SUB BRAKE (T)
BRAKE CONT. SLIDE
CONT. PLATE LEVER
S VHS DET. SWITCH
TAKE-UP REEL TABLE
SUPPLY REEL TABLE
SUB BRAKE (S)
REEL GEAR (S)
REEL GEAR (T)
IDLER GEAR ASS'Y (COMPL IDLER CLUTCH)
TAKE-UP BRAKE ASS'Y
MAIN SLIDE PLATE
SUPPLY BRAKE ASS'Y
FRONT

Fig. 2-1. TOP VIEW OF MECHANISM (INITIAL MODE)

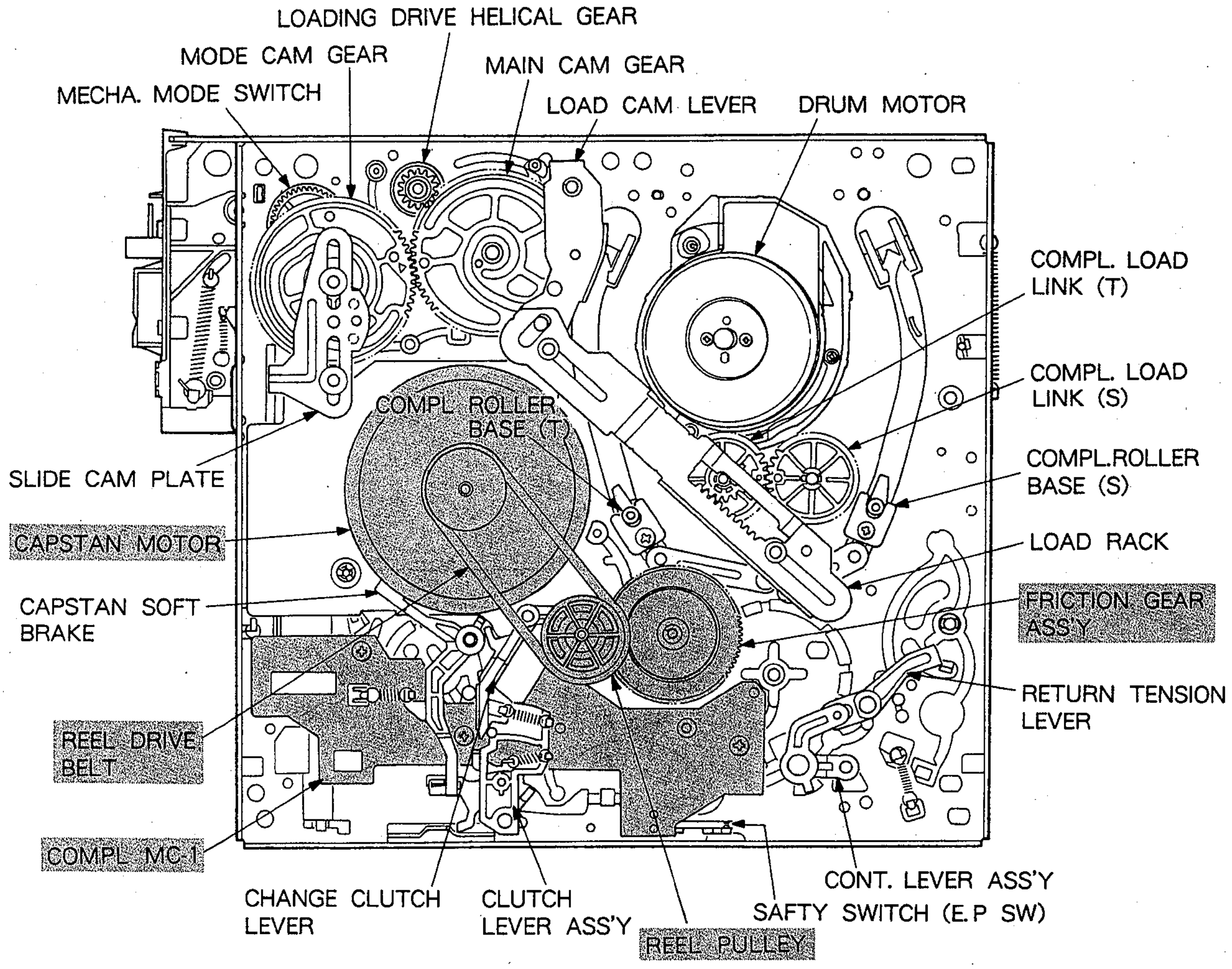

LOADING DRIVE HELICAL GEAR
MODE CAM GEAR
MECHA. MODE SWITCH
MAIN CAM GEAR
LOAD CAM LEVER
DRUM MOTOR
COMPL. LOAD LINK (T)
COMPL. LOAD LINK (S)
COMPL.ROLLER BASE (S)
LOAD RACK
FRICTION GEAR ASS'Y
RETURN TENSION LEVER
COMPL. ROLLER BASE (T)
SLIDE CAM PLATE
CAPSTAN MOTOR
CAPSTAN SOFT BRAKE
REEL DRIVE BELT
COMPL. MC-1
CHANGE CLUTCH LEVER
CLUTCH LEVER ASS'Y
REEL PULLEY
CONT. LEVER ASS'Y
SAFTY SWITCH (E.P SW)
FRONT

Fig. 2-2. BOTTOM VIEW OF MECHANISM (INITIAL MODE)

5-1. MECHANISM MAIN UNIT (See Fig. 5-1-1.)

1. Removal

1) Remove the connectors of the COMPL MC-3 and the COMPL HEAD BRACKET.
2) Remove the flexible cable ① connecting the COMPL CYLINDER to the PRE-AMP UNIT ③ (See Fig. A).
3) Remove the two screws ②, then remove the PRE-AMP UNIT ③.
4) Remove the screw ④, then remove the PRE-AMP. BRACKET ⑤.
5) Remove the two screws ⑥.
6) Remove the screw ⑦, two screws ⑪ and two screws ⑩.
   Then lift up the mechanism main unit and remove it. Since the TRAY ⑧ obstructs removal of the two front screws ⑩, move the TRAY LOCK LEVER ⑨ in the direction of the arrow to unlock, then slide the TRAY ⑧ before removing the screws. (See Fig. B)

Note: Shape of the PRE-AMP UNIT ③ and the PRE-AMP. BRACKET ⑤ differ depending on the model.

2. Remounting

1) Mount the mechanism main unit onto the chassis with the screw ⑦, two screws ⑪ and two screws ⑩.
2) Tighten the two screws ⑥.
3) Mount the PRE-AMP. BRACKET ⑤ with the two screws ④.
4) Mount the PRE-AMP UNIT ③ and the ground lug with the two screws ② (some models are not provided with a ground lug).
5) Insert the flexible cable ① into the connector of the PRE-AMP UNIT.
6) Connect the connectors of COMPL MC-3 and COMPL HEAD BRACKET.

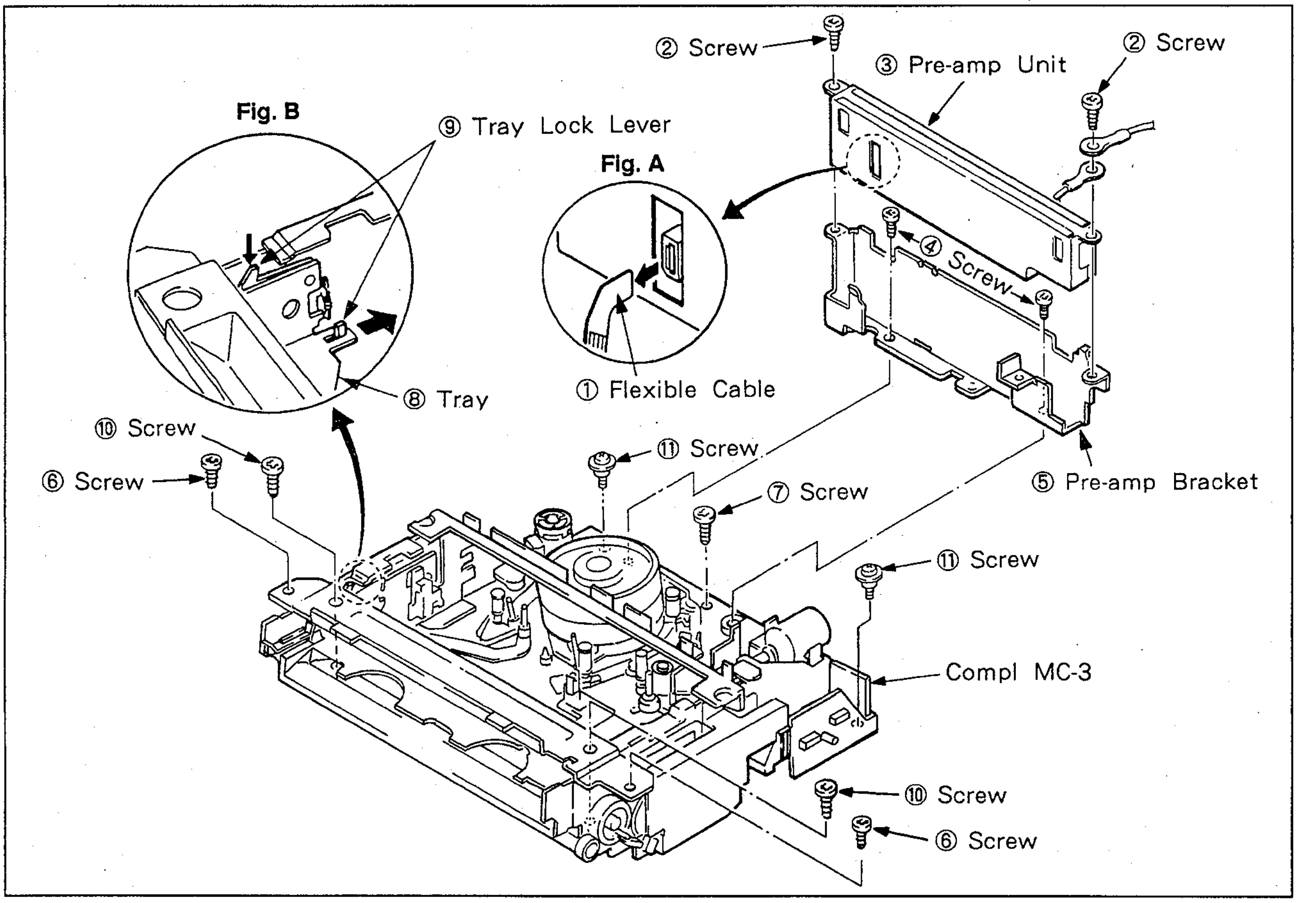

② Screw
③ Pre-amp Unit
② Screw
Fig. B
⑨ Tray Lock Lever
Fig. A
④ Screw
⑧ Tray
① Flexible Cable
⑩ Screw
⑥ Screw
⑪ Screw
⑦ Screw
⑤ Pre-amp Bracket
⑪ Screw
Compl MC-3
⑩ Screw
⑥ Screw

Fig. 5-1-1. Mechanism Main Unit

5-2. CASSETTE HOLDER MECHANISM

5-2-1. COMPL Cassette Mechanism (See Fig. 5-2-1.)

1. Removal

1) Set the video main unit to the EJECT completed mode.
2) Pull out the connectors (6-PIN CONNECTOR connected to the system control circuit board, ACE HEAD CONNECTOR, and FTE HEAD CONNECTOR) from CASSETTE HOLDER.
3) Remove the two screws ①.
4) Remove the two screws ②.
5) Lift up the COMPL CASSETTE MECHANISM ④ back a little and remove the two hooks ③ on the front (See Fig. B). When doing so, make sure that the SAFETY SWITCH LEVER is not caught by the mechanism chassis.

2. Remounting

1) Set the chassis section mechanism to the EJECT mode with the mode selector (VHJ-0050) (looking from above, match the front loading gear hole ⑤ with the MOTOR HOLDER hole ⑥ as shown in Fig. A).
2) Set the COMPL CASSETTE MECHANISM ④ to the EJECT completed mode.
3) Mount the COMPL CASSETTE MECHANISM ④ onto the mechanism chassis, aligning it with the protuberance.
   Match positions of the FRONT LOADING GEAR △ mark ⑦ and the RACK EJECT mark ⑧.
   (See Fig. A.)
4) Fix to the mechanism chassis with the two screws ②.
5) Fix to the chassis with the screw ①.
6) Connect to the various connectors.

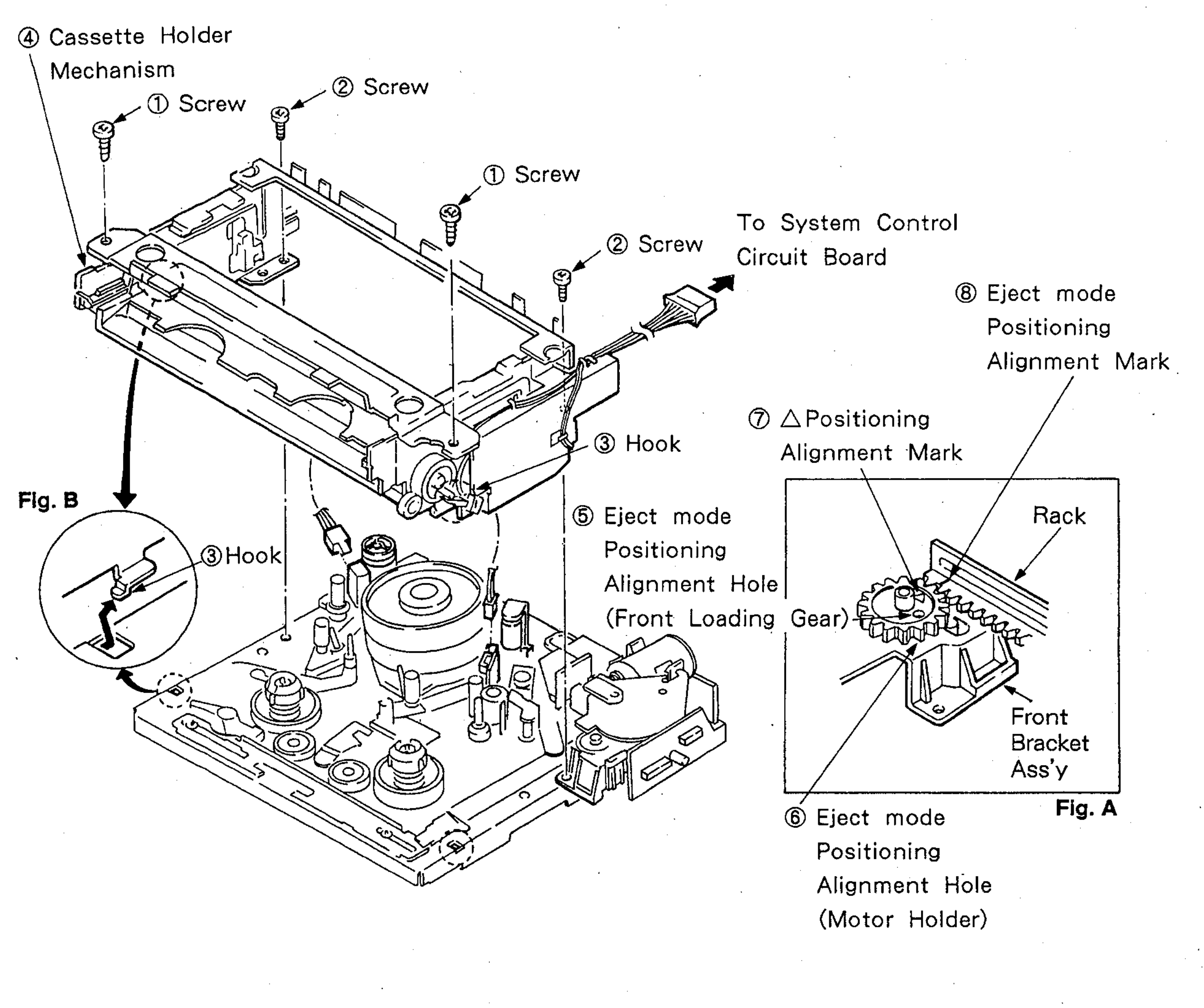

④ Cassette Holder Mechanism
① Screw
② Screw
① Screw
② Screw
To System Control Circuit Board
⑧ Eject mode Positioning Alignment Mark
⑦ △Positioning Alignment Mark
③ Hook
Fig. B
③Hook
⑤ Eject mode Positioning Alignment Hole (Front Loading Gear)
Rack
Front Bracket Ass'y
⑥ Eject mode Positioning Alignment Hole (Motor Holder)
Fig. A

Fig. 5-2-1. Compl Cassette Mechanism.

5-2-3. Cassette Drive Gear (Right) (See Fig. 5-2-3.)

1. Removal

1) Remove the COMPL CASSETTE MECHANISM and the GEAR BRACKET ASS'Y as instructed in 5-2-1. and 5-2-2., respectively.
2) Remove the IDLER GEAR ①.
3) Remove the SPRING COIL ②, then remove the MAIN GEAR ③.
4) Remove the E ring ④, then remove the LEVER GEAR ASS'Y R ⑤.
5) Open the hook ⑥ and remove the COUPLE GEAR R ⑦. Take care not to open the hook ⑥ too much, otherwise it may get deformed or broken. If it does, replace it.
6) Remove the IDLER GEAR R ⑧.

2. Remounting

1) Apply grease to gear parts that undergo friction.
2) Mount the IDLER GEAR R ⑧ onto the axle ⑨.
3) Mount the COUPLE GEAR R ⑦ onto the ROD ASS'Y axle ⑩. When doing so, match the couple gear position with the IDLER GEAR R ⑧ as shown in Fig. A.
4) Mount the LEVER GEAR ASS'Y R ⑤ onto the axles ⑪ and ⑫. Match position to the IDLER GEAR R ⑧ as shown in Fig. A.
5) Mount the E ring ④ onto the axle ⑫.
6) Mount the MAIN GEAR ③ onto the axle ⑪. When doing so, match position to the IDLER GEAR R ⑧ as shown in Fig. A.
7) Hook the SPRING COIL ② to the notch ⑬ in the MAIN GEAR R ③ and the LEVER GEAR ASS'Y R.
8) Mount the IDLER GEAR ① onto the axle ⑭. When doing so, match position to the MAIN GEAR as shown in Fig. A.
9) Mount the GEAR BRACKET ASS'Y and the COMPL CASSETTE MECHANISM ASS'Y as instructed in 5-2-2. and 5-2-1., respectively.

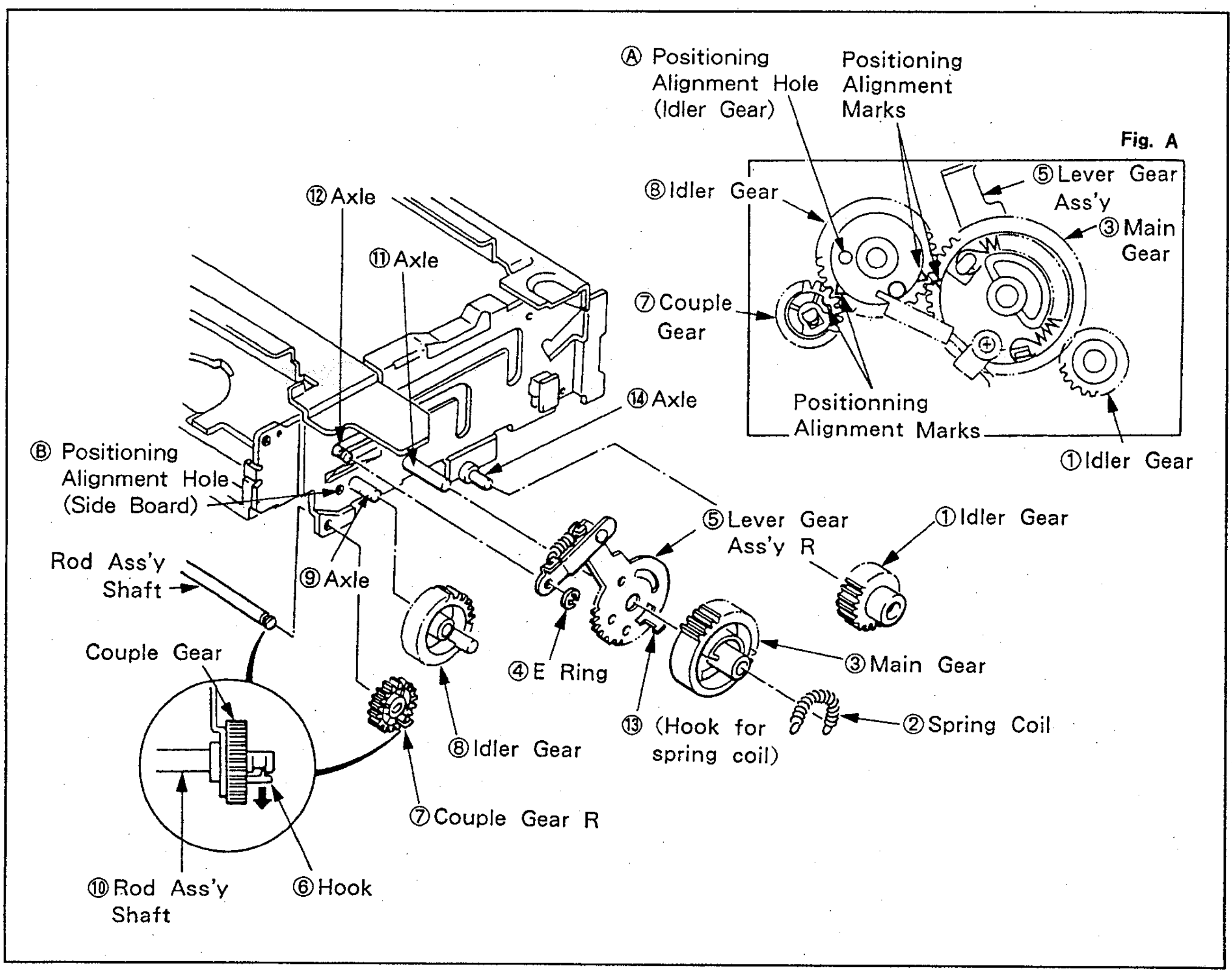

Ⓐ Positioning Alignment Hole (Idler Gear)
Positioning Alignment Marks
Fig. A
⑤Lever Gear Ass'y
③Main Gear
⑧Idler Gear
⑦Couple Gear
Positionning Alignment Marks
①Idler Gear
⑫Axle
⑪Axle
⑭Axle
Ⓑ Positioning Alignment Hole (Side Board)
Rod Ass'y Shaft
⑨Axle
Couple Gear
⑤Lever Gear Ass'y R
①Idler Gear
④E Ring
③Main Gear
⑬ (Hook for spring coil)
②Spring Coil
⑧Idler Gear
⑦Couple Gear R
⑩Rod Ass'y Shaft
⑥Hook

Fig. 5-2-3. Cassette Drive Gears (Right Side)

5-2-4. Cassette Drive Gear (Left) (See Fig. 5-2-4)

1. Removal

1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
2) Remove the COUPLE GEAR R as instructed in 5-2-3.
3) Remove the ROD ASS'Y ①.
4) Remove the E ring ②.
5) Remove the hook ③, then remove the LEVER GEAR ASS'Y L ④. Take care not to open the hook ③ too much, otherwise it may get deformed or broken. If it does, replace it.
6) Remove the SPRING COIL ⑤ from the LEVER GEAR ASS'Y ④.
7) Remove the IDLER GEAR L ⑥ and the DOOR OPEN LEVER ⑦.

2. Remounting

1) Apply grease to the axles ⑧, ⑨ and ⑩.
2) Apply grease to the IDLER GEAR L ⑥.
3) Mount the DOOR OPEN LEVER ⑦ onto the axle ⑧. Do it so that the end of the DOOR OPEN LEVER ⑦ leans against the front side of the CASSETTE DOOR ⑪ as shown in Fig. A.
   CASSETTE DOOR ⑪ is built in the front cabinet.
4) Mount the IDLER GEAR L ⑥ onto the axle ⑧.
5) Pass the ROD ASS'Y ① through the hole ⑫. Match position of the COUPLE GEAR L ⑬ and the IDLER GEAR L ⑥ as shown in Fig B.
6) Mount the COUPLE GEAR R as instructed in 5-2-3.
7) Hook the SPRING COIL ⑤ to the LEVER GEAR ASS'Y L ④.
8) Mount the LEVER GEAR ASS'Y L ④ onto the axle ⑨ and the shaft ⑩. Match position to the IDLER GEAR L ⑥ as shown in Fig. B.
9) Mount the COMPL CASSETTE MECHANISM onto the chassis as instructed in 5-2-1.

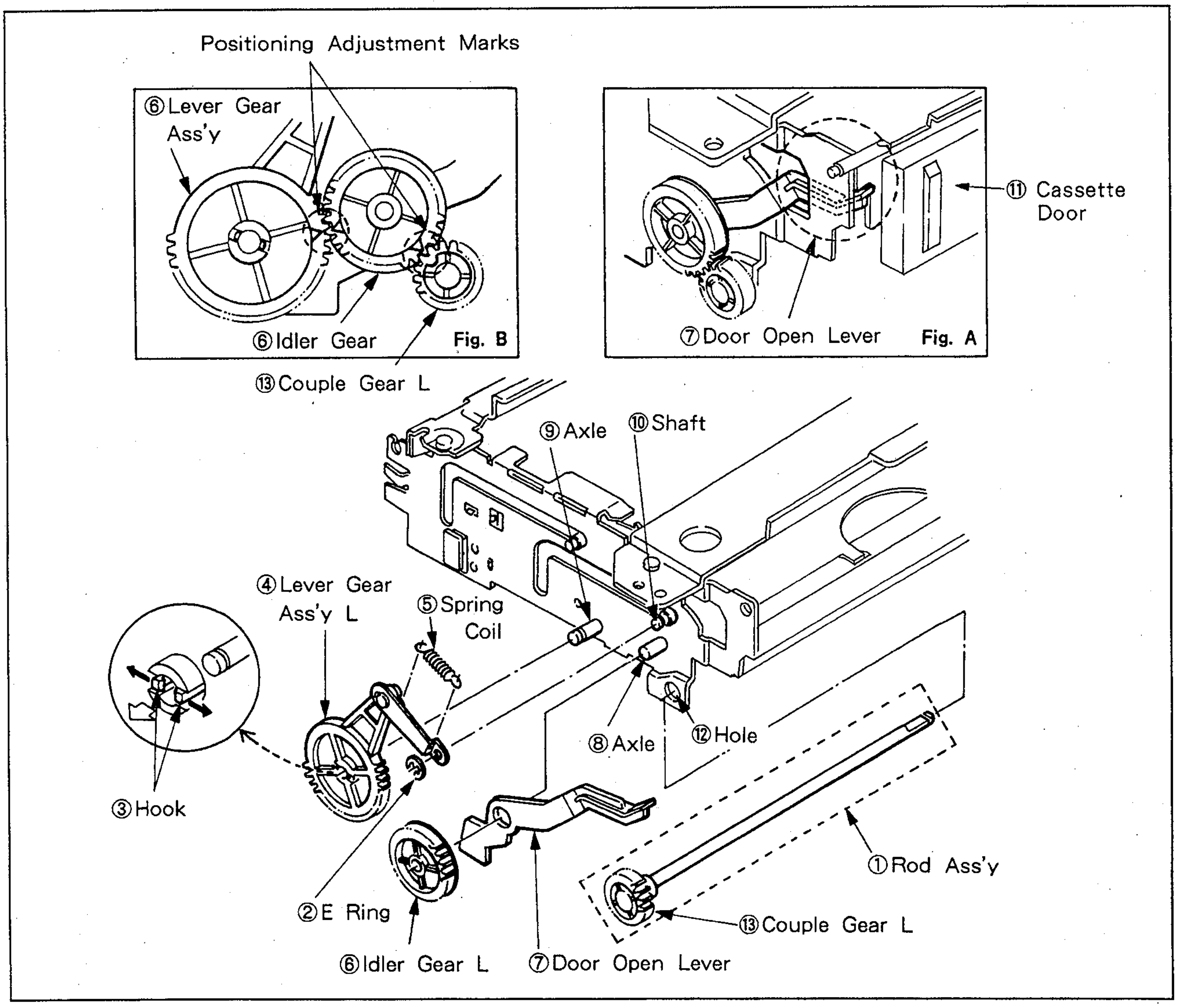

Positioning Adjustment Marks
⑥Lever Gear Ass'y
⑥Idler Gear
Fig. B
⑬Couple Gear L
⑪ Cassette Door
⑦Door Open Lever
Fig. A
⑨Axle
⑩Shaft
④Lever Gear Ass'y L
⑤Spring Coil
③Hook
⑧Axle
⑫Hole
①Rod Ass'y
②E Ring
⑬Couple Gear L
⑥Idler Gear L
⑦Door Open Lever

Fig. 5-2-4. Cassette Drive Gears (Left Side)

5-10. FIXED GUIDE, FE HEAD LEVER ASS'Y

5-10-1. Entrance side Fixed Guide, FE Lever Ass'y and Exit side Impedance Roller (See Fig. 5-10-1.)

1. Removal

1) Remove the special nut ①, Then remove the GUIDE PIPE ③ and the special washer ②, in that order.
2) Remove the SPRING COIL ⑤.
3) Remove the FTE HEAD connector.
4) Remove the special washer ⑥, then remove the FE HEAD LEVER ASS'Y ⑦.
5) Remove the screw ⑲, IMPEDANCE HOLDER ⑪ and EXIT SIDE IMPEDANCE ROLLER ⑫ with IMPEDANCE BRACKET ⑬.
6) Open the IMPEDANCE BRACKET hook ⑰ a little and remove the EXIT SIDE IMPEDANCE ROLLER ⑫.

Note: When removing and remounting the impedance roller, handle it carefulley to protect it from scratches and dirt.

2. Remounting

1) Mount the IMPEDANCE BRACKET ⑬ onto the EXIT SIDE IMPEDANCE ROLLER ⑫. Confirm that the hook ⑰ is hooked to the EXIT SIDE IMPEDANCE ROLLER ⑫.
2) Mount the EXIT SIDE IMPEDANCE ROLLER ⑫ onto the AXLE ⑭.
3) While aligning the IMPEDANCE HOLDER hole ⑯ with the protuberance ⑮, mount the IMPEDANCE HOLDER ⑪ to the DRUM BASE ⑱ with the screw ⑲.
4) After mounting the FE HEAD LEVER ASS'Y ⑦ onto the AXLE ⑧, mount the special washer ⑥.
5) Hook the SPRING COIL ⑤ between the chassis notch ⑨ and the FE HEAD LEVER ASS'Y hook ⑩.
6) Mount the special washer ②, the GUIDE PIPE ③ and the special nut ① to the AXLE ⑧, in that order.
7) At that time, do not excessively tighten the special nut to avoid idle rotation of the axle ribet. The height of fixing guide on the inlet side is not required.
8) Connect the connector to the FTE HEAD.

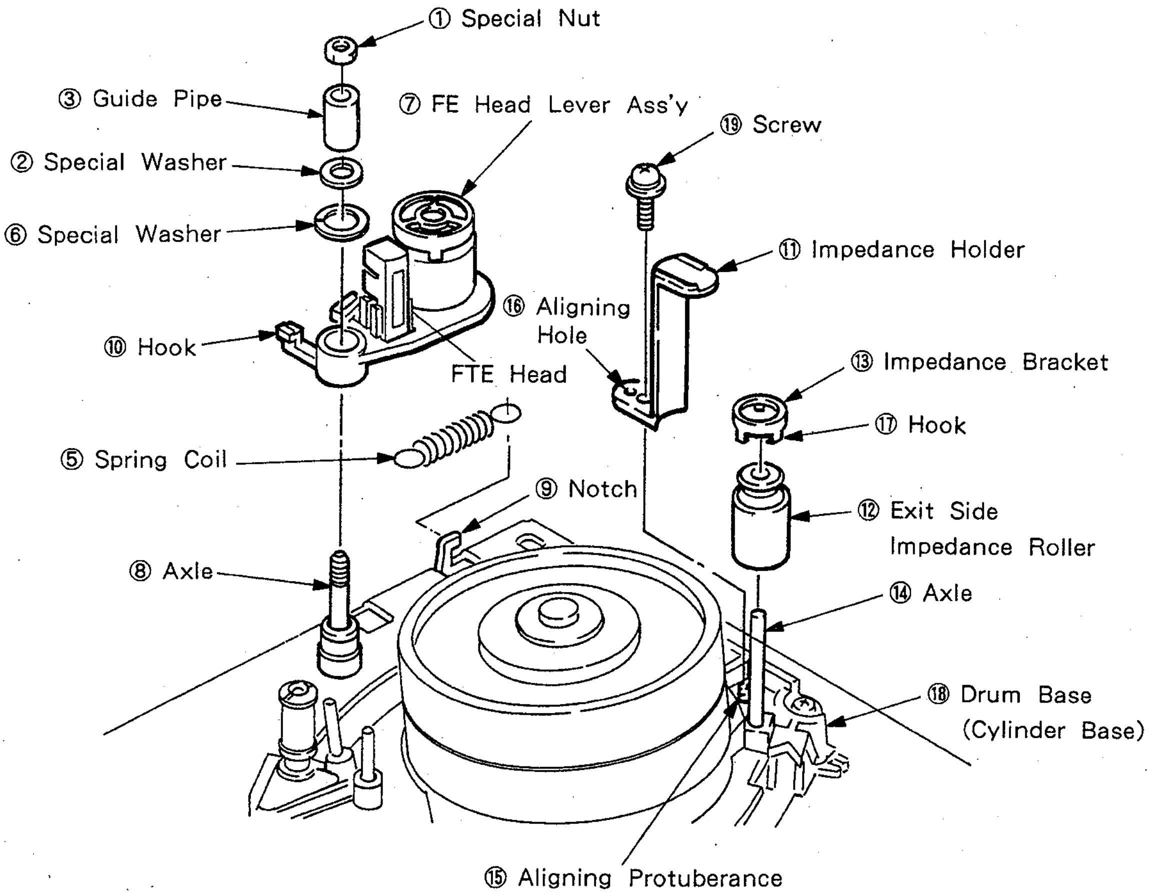

① Special Nut
③ Guide Pipe
⑦ FE Head Lever Ass'y
⑲ Screw
② Special Washer
⑥ Special Washer
⑪ Impedance Holder
⑯ Aligning Hole
⑩ Hook
FTE Head
⑬ Impedance Bracket
⑰ Hook
⑤ Spring Coil
⑨ Notch
⑫ Exit Side Impedance Roller
⑧ Axle
⑭ Axle
⑱ Drum Base (Cylinder Base)
⑮ Aligning Protuberance

Fig. 5-10-1. Entrance side Fixed Guide, FE Lever Ass'y and Exit side Impedance Roller

5-10-2. Entrance side Impedance Roller and FTE Head (See Fig. 5-10-2.)

1. Removal

1) Remove the FTE HEAD ① connector.
2) Open the hook ② a little, then remove the IMPEDANCE BRACKET ④.
3) Remove the special washer ⑧, then remove the ENTRANCE SIDE IMPEDANCE ROLLER ③.
4) Open the hook ⑤ a little and remove the FTE HEAD ①.

Note: Take care not to open the hook too much, otherwise it may be deformed or broken.

2. Remounting

1) Mount the FTE HEAD ① onto the FE HEAD LEVER ASS'Y ⑥. Confirm that the hook ⑤ is hooked to the FTE HEAD ①.
2) Mount the ENTRANCE SIDE IMPEDANCE ROLLER ③ onto the AXLE ⑦, then mount the special washer ⑧.
3) Mount the IMPEDANCE BRACKET ④ onto the ENTRANCE SIDE IMPEDANCE ROLLER ③. Confirm that the hook ② is hooked to the ENTRANCE SIDE IMPEDANCE ROLLER ③.
4) Connect the connector to the terminal of the FTE HEAD ①.

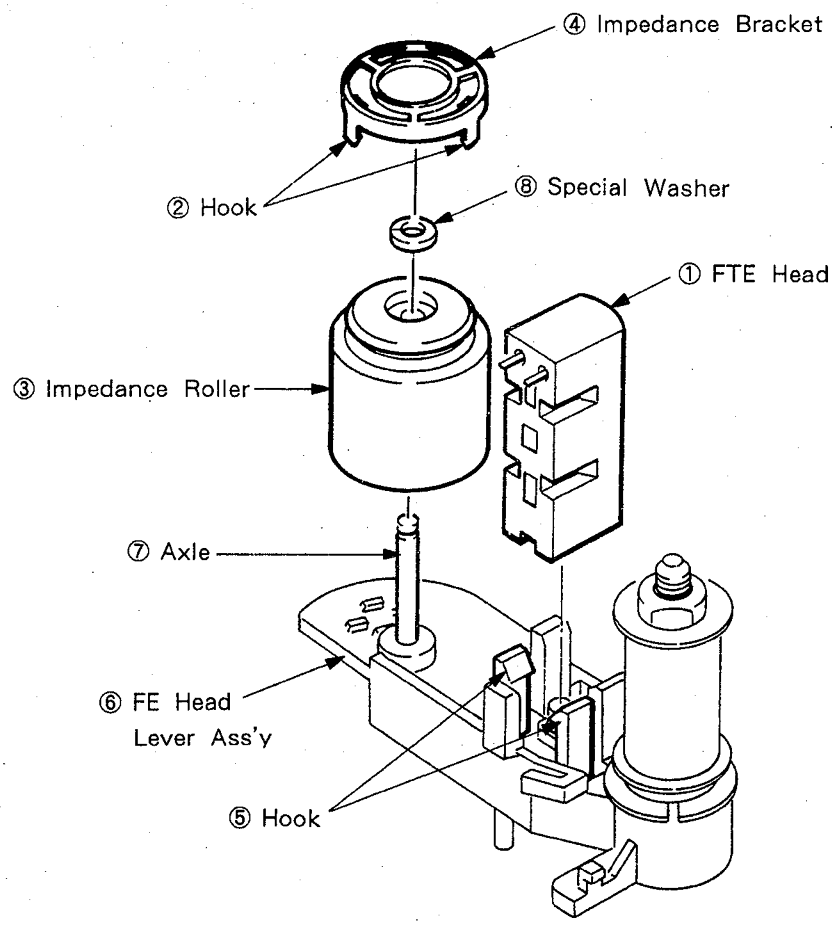

④ Impedance Bracket
② Hook
⑧ Special Washer
① FTE Head
③ Impedance Roller
⑦ Axle
⑥ FE Head Lever Ass'y
⑤ Hook

Fig. 5-10-2. Entrance side Impedance Roller and FTE Head

SANYO

SANYO Electric Co., Ltd.
Osaka, Japan

Jan. / '91 / 5800 SU
Printed by: Schaltungsdienst Lange, Berlin (GERMANY)

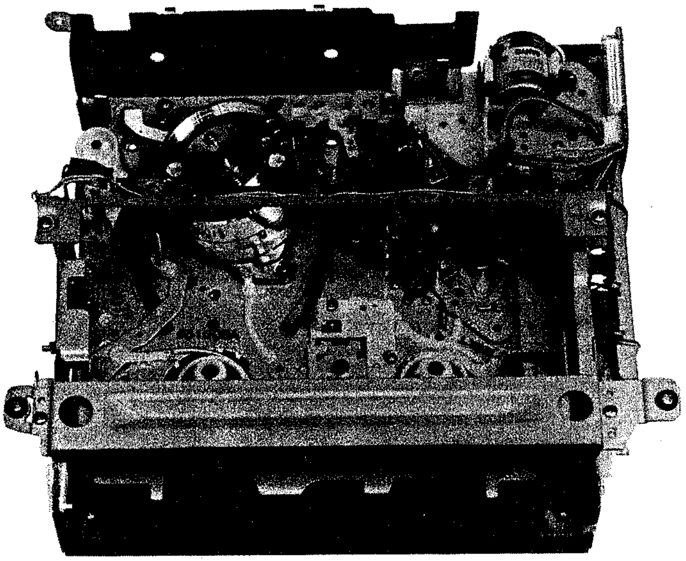
V10319

SANYO

Supplement Service Technical Information

Video Cassette Recorder

P92 Mechanism



VHS PAL SECAM

Use this supplement together with the P90 Mechanism Manual (WM-530599) of the Service Technical Information published in 1990.

CONTENTS

1. Outline of P92 Mechanism ·········· 1
2. Sections changed from P90 Mechanism ······························ 2
    - 2-2. Description of Mechanism Drive ·············· 3
    - 4-1-3. Service jigs ····················· 7
    - 4-2-2. Connection Method 1 ······ 8
    - 4-2-3. Connection Method 2 ······ 9
    - 5-2-2. Gear Bracket Ass'y ········· 10
    - 5-2-4. Cassette Drive Gear (left) 11
    - 5-4. Tape Loading Mechanism··· 12
    - 5-6. Pinch Roller Pressure Mechanism ······················· 14

5-8-4. Reel Pulley and Friction Gear Ass'y ····················· 15

5-8-5. COMPL Clutch ··············· 16

5-10. Fixed Guide, FE Head Lever Ass'y ························ 17

5-10-3. Exit side Fixed Guide ······ 18

5-13. Auto Head Cleaner Mechnism Removal/Reassembly ········ 19

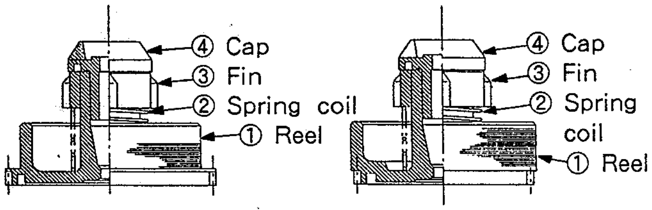
1. OUTLINE OF P92 MECHANISM

P92 mechanism is used for video tape recorders shipped as new product of 1992.
The P92 mechanism has the same basic structures as the P90 mechanism shipped in 1990 except below contents. As this manual omits the description of the same contents with P90, please refer to the P90 Mechanism Service Technical Information.

Note: (1) to (10) of the followings have been already changed in "P91 mechanism" and repeated in " SUPPLEMENT of P91 mechanism".

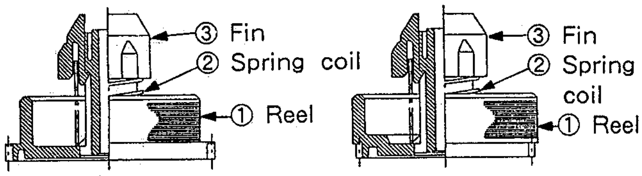
(1) The five components of the reel drive system, supply reel table, take up reel table, reel gear (S), reel gear (T) and COMPL idler clutch, are replaced with those of new one to prevent picture-shifting in the R-search.

As shown in the figure 1-a and 1-b, there are two types of the supply reel table and take up reel table used for the model produced in 1992. One is an old reel table with a cap and fin in the figure 1-a, and the other is a new reel table of monolithic construction without a cap in the figure 1-b.
The colour of the new supply reel table and take up reel table are different from the old ones for identification. The colours of the new and old reel tables are described in the table 1 below.



SUPPLY REEL TABLE TAKE UP REEL TABLE

Fig. 1-a Old



SUPPLY REEL TABLE TAKE UP REEL TABLE

Fig. 1-b New

Note: Five parts of the reel driving system are the supply reel table, take up reel table, reel gear (S), reel gear (T) and COMPL idler clutch.

Mechanism		Supply Reel Table			Take up Reel Table			Remarks
		①	③	④	①	③	④	
A	Old reel of P92 mechanism	Light Blue	Black	White	Light Blue	White	White	A is interchangeable with B and C, if changing the entire 5 components of the reel drive system. In other cases, it has no interchangeability.
	New reel of P92 mechanism	White	Light Blue	–	White	Green	–	
B	Old reel of P88, P89, P90 and P91 mechanism	White	White	White	White	White	White	B cannot be used for A and B.
	New reel of P88, P89, P90 and P91 mechanism	White	Black	–	White	White	–	
C	Old reel of P90 S-VHS mechanism	Gray	Black	White	Gray	White	White	C is interchangeable with A, if changing the entire 5 components of the reel drive system. In other cases, it has no interchangeability.

Refer to the figure 1-a and 1-b for No.①,③ and ④.
The old and new, are discriminated by the colour of ① reel, ③ fin and ④ cap.

Table 1

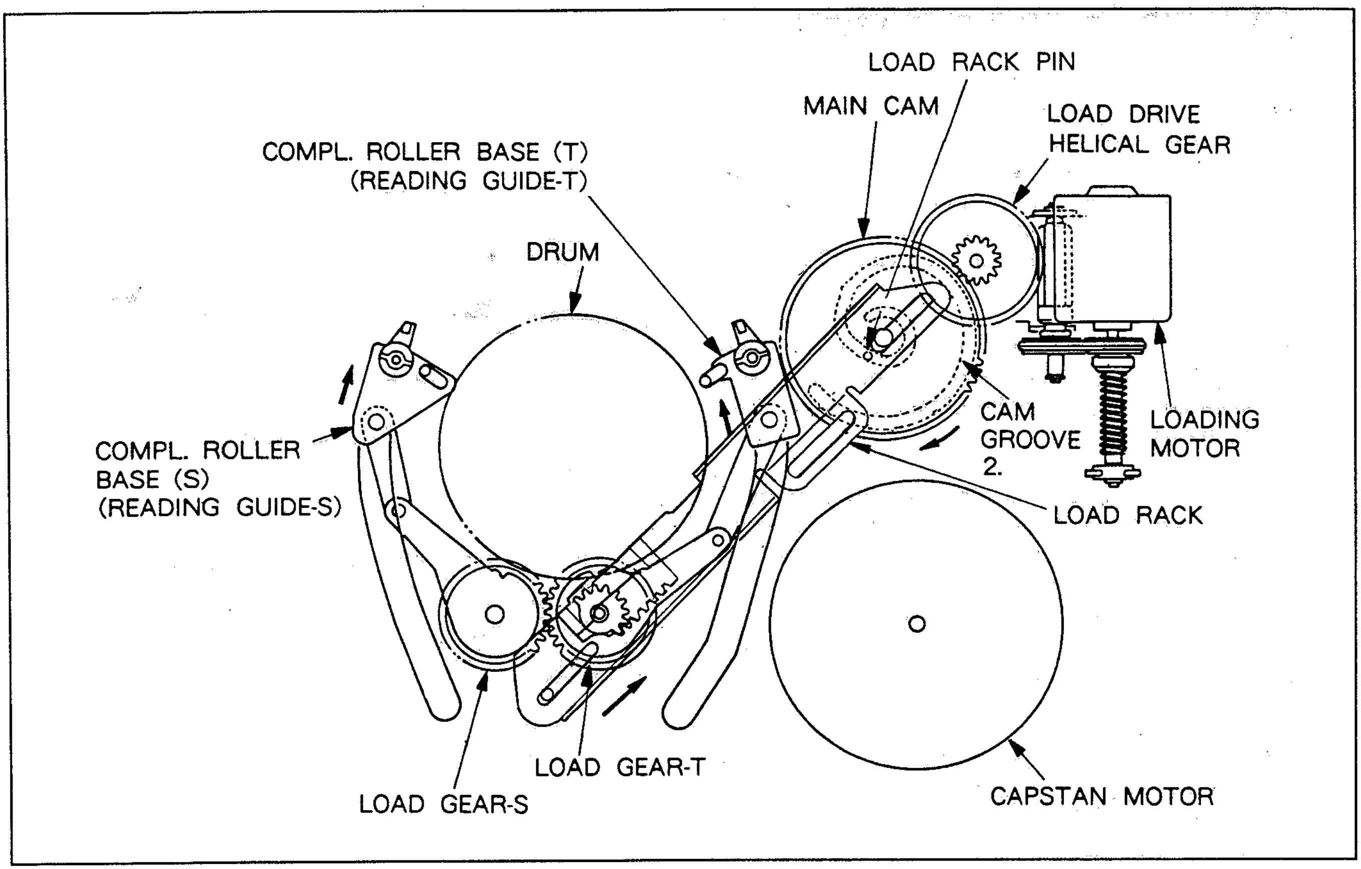


Fig. 2-1 CONSTRUCTION OF TAPE LOADING MECHANISM

(2) The main cam gear, load rack COMPL and load (T) are replaced with new ones to more simplify the tape loading mechanism. Therefore, the load cam lever of the old mechanism is not required. The new tape loading mechanism is shown in the figure 2-1.

(3) In compact size model (width : 360mm), the MC-2 and MC-3 boards between the loading motor and system control circuit are replaced with new ones. Therefore, a relay board (VHJ-0089) is required for using the service tool mode selector (VHJ-0050). The new MC-2 board has the connectors of CN817 (6 Pin type) and CN818 (2 Pin type) at the both sides of the CN811, and is marked "92" with large letters. The MC-2 board is mounted with one mechanical screw. As for the mid mount model, the same relay board (VHJ-0075) as P90 mechanism is used.

(4) The pulley bracket is disused and the special screw is employed. [However, the pulley bracket is used to S VHS mechanism (High speed FF/REW mechanism)]

(5) The shape of the clutch lever assembly is partially changed and the damper is disused.

(6) The shape of the front helical gear of the loading motor is partially changed and the washer is disused.

(7) The 4 screws for mounting the gear bracket assembly of the COMPL cassette mechanism are changed to 3 screws.

(8) The height adjustment of the exit side fixed guide is unnecessary by improvement in precision of the tape running system.

(9) The form of MC-1 and MC-4 board connector (CN801) near the reel drive part are changed.

(10) Auto head cleaner mechanism is used for cleaning video head automatically when loading and unloading.

2. SECTIONS CHANGED FROM P90 MECHANISM

The page number within the parenthesis above each title mentioned later indicates the page number of the P90 Mechanism Service Technical information. Replace the page numbers with those in the parenthesis on usage.

2-2. DESCRIPTION OF MECHANISM DRIVE

To realize the thin type mechanism, a loading motor and two pieces of cam (MAIN CAM GEAR and the MODE CAM GEAR) to be driven by the said motor are mounted on the upper part of the capstan motor, that was a dead space in the conventional mechanisms hitherto available, with a view to optimization of parts mounting layout. (Fig. 2-1 and Fig. 2-2.)

- IMPEDANCE ROLLER and FE HEAD are not used to the exclusive model for playback.
- The shaded sections are different from P90 mechanism.

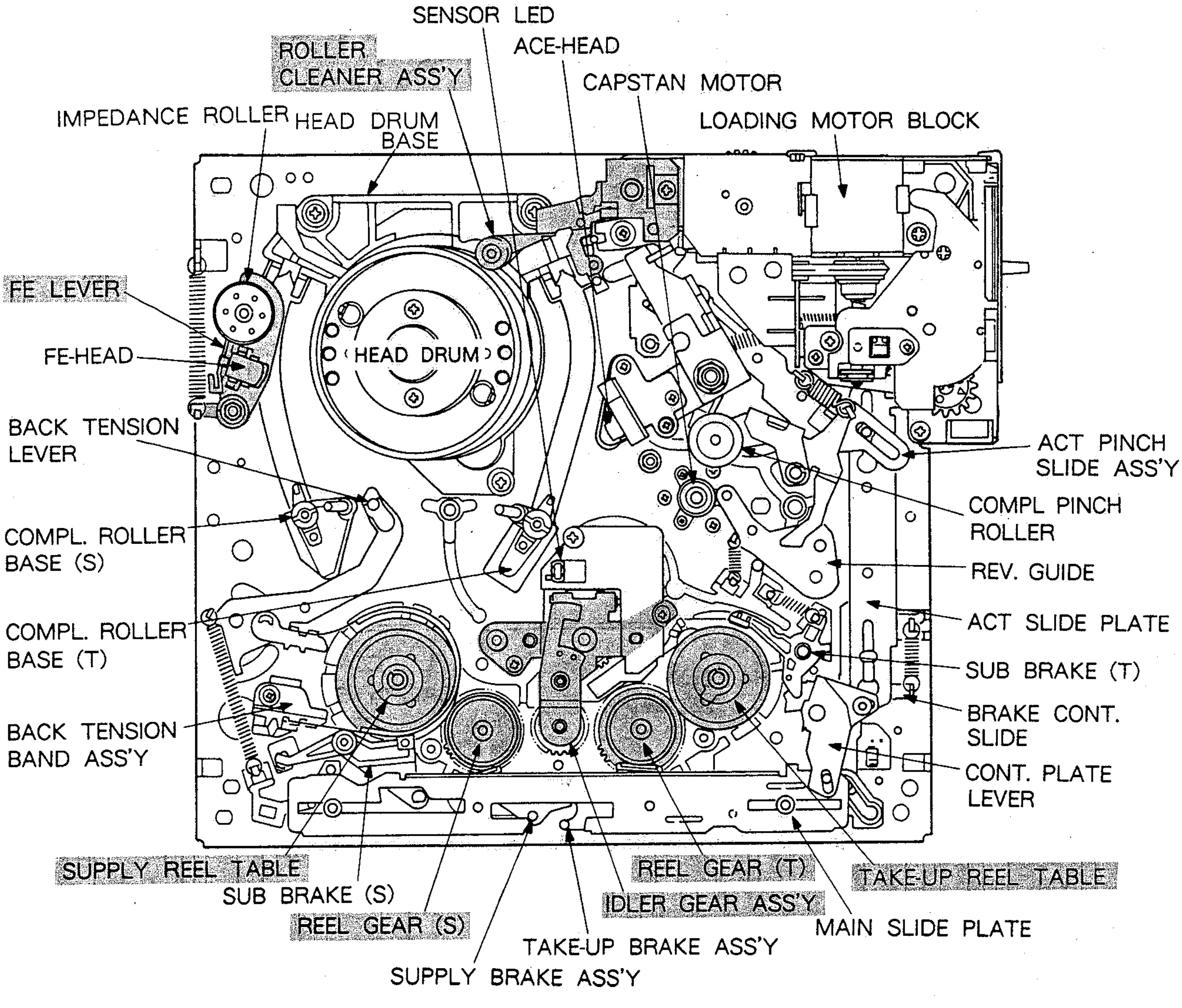

SENSOR LED
ROLLER CLEANER ASS'Y
ACE-HEAD
CAPSTAN MOTOR
IMPEDANCE ROLLER
HEAD DRUM BASE
LOADING MOTOR BLOCK
FE LEVER
FE-HEAD
HEAD DRUM
BACK TENSION LEVER
ACT PINCH SLIDE ASS'Y
COMPL PINCH ROLLER
COMPL. ROLLER BASE (S)
REV. GUIDE
COMPL. ROLLER BASE (T)
ACT SLIDE PLATE
SUB BRAKE (T)
BRAKE CONT. SLIDE
BACK TENSION BAND ASS'Y
CONT. PLATE LEVER
SUPPLY REEL TABLE
REEL GEAR (T)
TAKE-UP REEL TABLE
SUB BRAKE (S)
IDLER GEAR ASS'Y
REEL GEAR (S)
MAIN SLIDE PLATE
TAKE-UP BRAKE ASS'Y
SUPPLY BRAKE ASS'Y
FRONT

Fig. 2-1. Top View of Mechanism (Initial mode)

- Some models have no Capstan Soft Brake.
- SAFTY SWITCH is not used to the exclusive model for playback.
- The shaded sections are different from P90 mechanism.

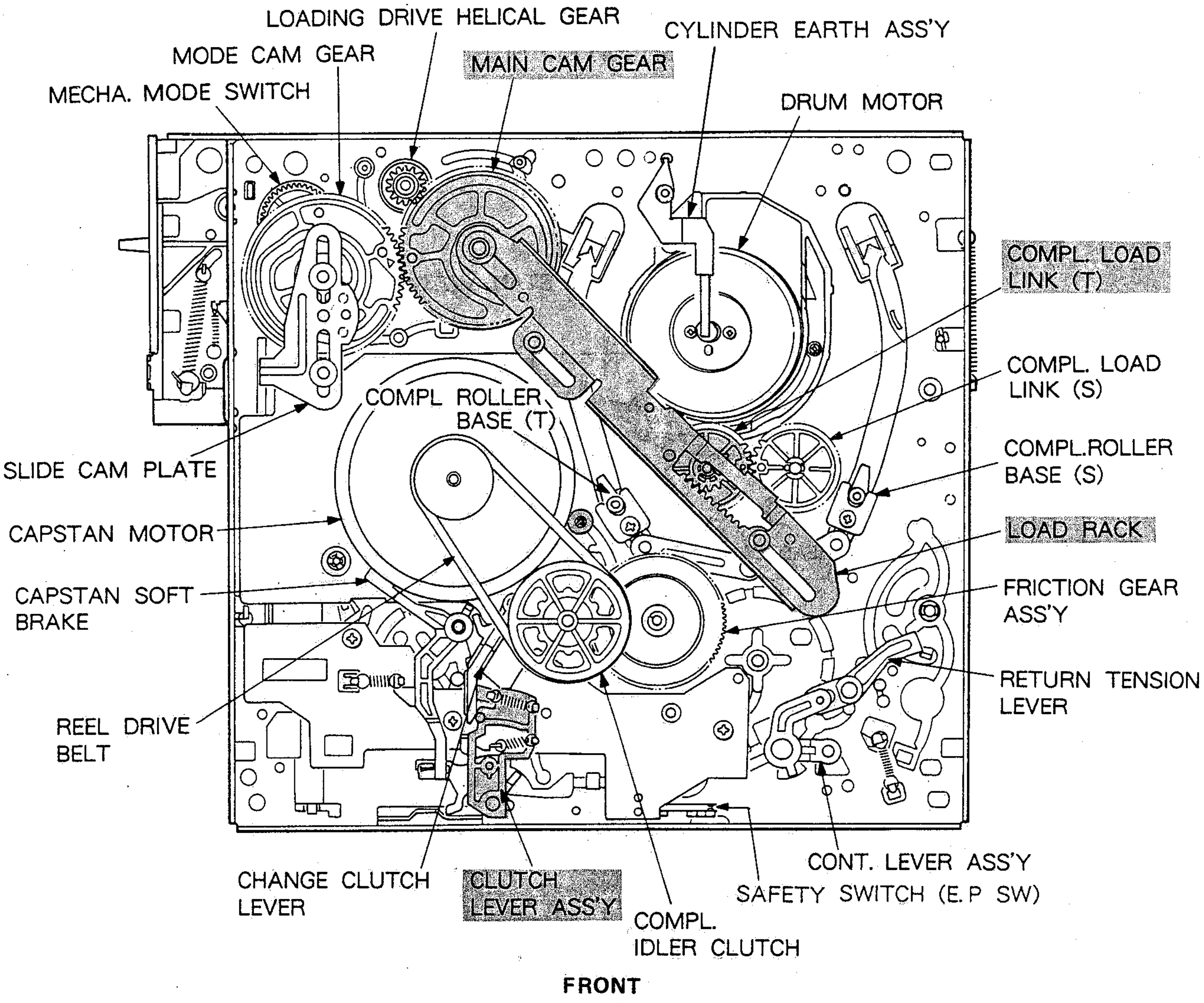

LOADING DRIVE HELICAL GEAR
CYLINDER EARTH ASS'Y
MODE CAM GEAR
MAIN CAM GEAR
MECHA. MODE SWITCH
DRUM MOTOR
COMPL. LOAD LINK (T)
COMPL. LOAD LINK (S)
COMPL ROLLER BASE (T)
COMPL.ROLLER BASE (S)
SLIDE CAM PLATE
CAPSTAN MOTOR
LOAD RACK
CAPSTAN SOFT BRAKE
FRICTION GEAR ASS'Y
RETURN TENSION LEVER
REEL DRIVE BELT
CONT. LEVER ASS'Y
CHANGE CLUTCH LEVER
CLUTCH LEVER ASS'Y
SAFETY SWITCH (E.P SW)
COMPL. IDLER CLUTCH
FRONT

Fig. 2-2. Bottom View of Mechanism (Initial mode)

[Page 7]

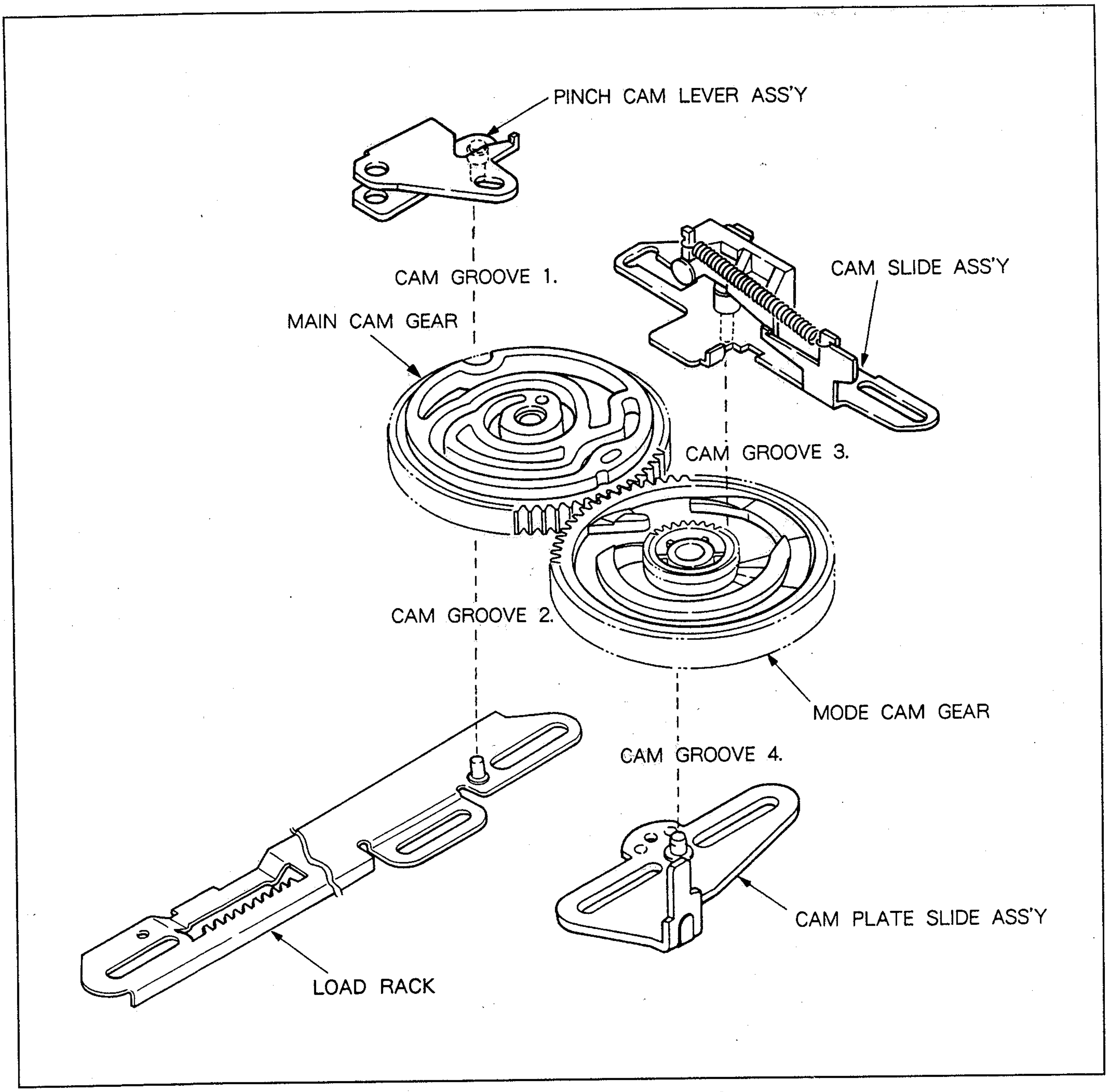

PINCH CAM LEVER ASS'Y
CAM SLIDE ASS'Y
CAM GROOVE 1.
MAIN CAM GEAR
CAM GROOVE 3.
CAM GROOVE 2.
MODE CAM GEAR
CAM GROOVE 4.
CAM PLATE SLIDE ASS'Y
LOAD RACK

Fig. 2-4. View of Cams Construction

(1) Tape Loading Mechanism

The tape loading mechanism is compactly designed with use of a LOAD RACK for loading by drive from the before-mentioned MAIN CAMs with CAM GROOVE 2. The LOAD RACK is laid on the dead space in between the DD capstan motor and the head motor for effective space utilization. (Fig. 6-2-5)
The process from tape pull-out upon loading to contact of the leading guide section with the stopper of drum base and press-fitting under tension of spring is guided and driven in such a manner that the rod is drawn inward from the outer circumferential direction of the CAM GROOVE 2, thereby reducing the load torque (PV value) to the CAM GROOVE. And, the load of the loading motor is minimized to enhance reliability.

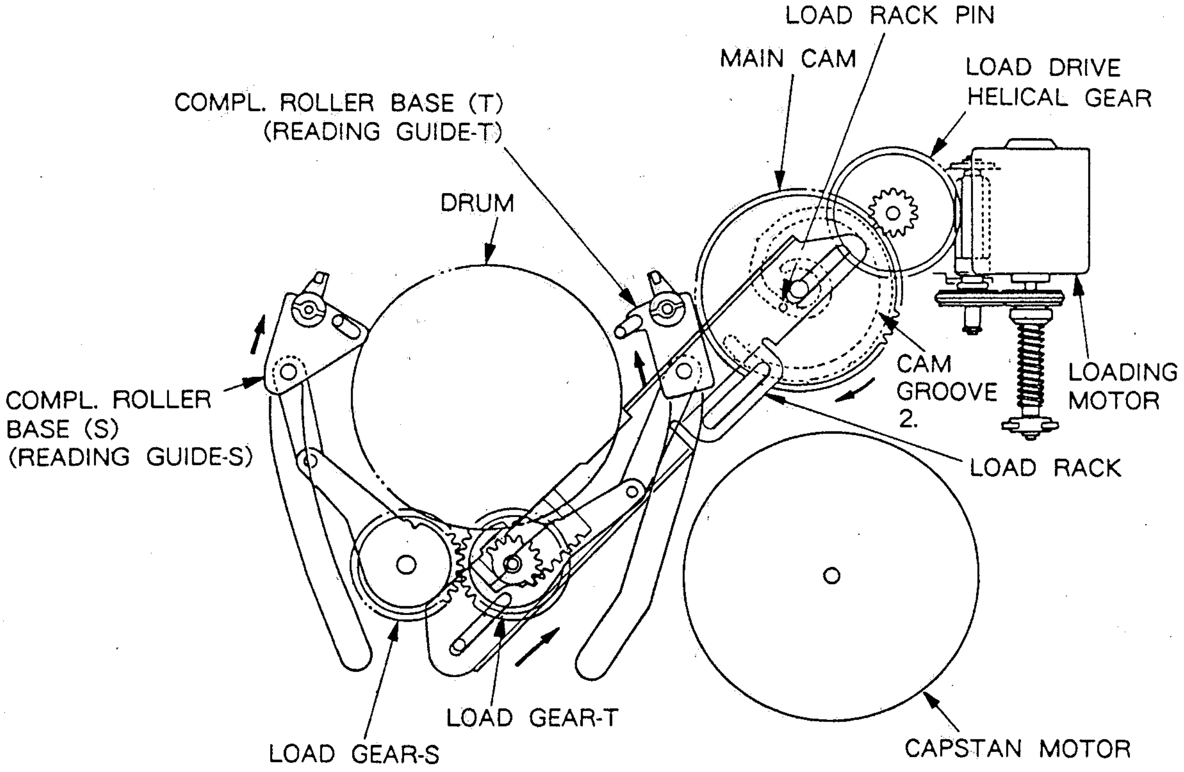

LOAD RACK PIN
MAIN CAM
LOAD DRIVE HELICAL GEAR
COMPL. ROLLER BASE (T) (READING GUIDE-T)
DRUM
COMPL. ROLLER BASE (S) (READING GUIDE-S)
CAM GROOVE 2.
LOADING MOTOR
LOAD RACK
LOAD GEAR-T
LOAD GEAR-S
CAPSTAN MOTOR

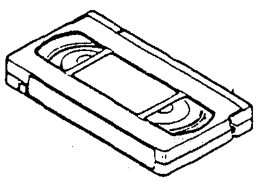
Fig. 2-5. Construction of Tape Loading Mechanism

[Page 28]

4-1-3. Service Jigs

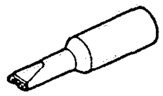
No.	Jig	Jig No.	Remarks
1	Alignment tape	VHJ-0008	SP color bar, 1kHz (normal)
2	Alignment tape	VHJ-0009	SP monoscope, 7kHz (normal)
3	Alignment tape	VHJ-0052	EP monoscope
4	Eccentric screwdriver	VHJ-0003	For tape path adjustment
5	Nut box	VHJ-0048	For fixed guide removal
6	Torque gauge	VHJ-0004	For reel take-up torque measurement
7	Cassette torquemeter	VHJ-0016	For back tension torque measurement
8	Position adjustment gauge	VHJ-0049	For position adjustment
9	Torque gauge screwdriver	VHJ-0014	For screw fastening torque adjustment
10	3mm dia. bit for torque screwdriver	VHJ-0045	Spare bit for the torque gauge screwdriver
11	Video head removing tool	VHJ-0041	For upper drum removal
12	Cassette stand plate gauge	VHJ-0001	For reel height adjustment
13	Mode selector	VHJ-0050	For mechanism mode selection
14	26-pin flexible flat cable	VHJ-0064	Spare cable for mode selector
15	Mode selector relay board	VHJ-0075	Relay board for mode selector (For "Mid mount" model)
16	7-wire flat cable	VHJ-0076	Spare cable for VHJ-0075
17	Mode selecter relay baord	VHJ-0089	Relay board for mode selector [For compact size model (width : 360mm)]
18	REV guide lever removing tool	VHJ-0073	For REV guide lever removal

VHJ-0005, VHJ-0006, VHJ-0007



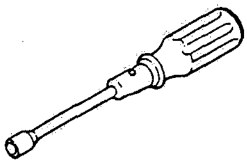
No. 1, 2, 3

VHJ-0003



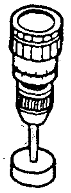
No. 4

VHJ-0048



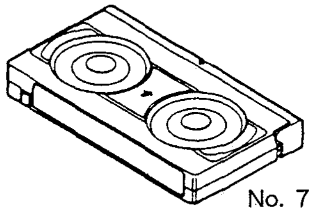
No. 5

VHJ-0004



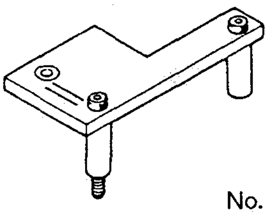
No. 6

VHJ-0016



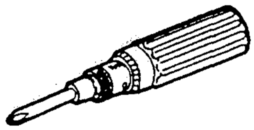
No. 7

VHJ-0049



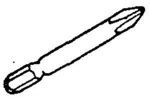
No. 8

VHJ-0014



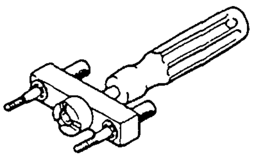
No. 9

VHJ-0045



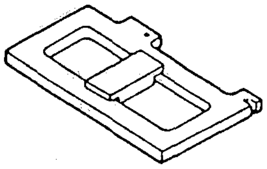
No. 10

VHJ-0041



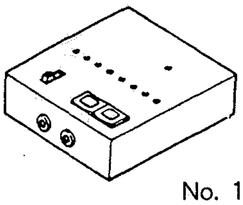
No. 11

VHJ-0001



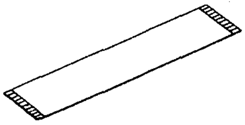
No. 12

VHJ-0050



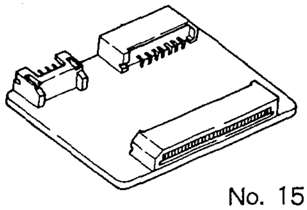
No. 13

VHJ-0064



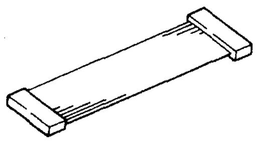
No. 14

VHJ-0075



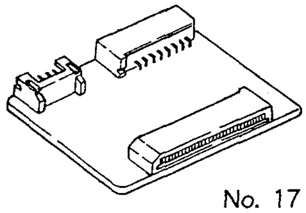
No. 15

VHJ-0076



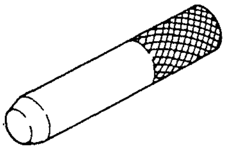
No. 16

VHJ-0089



No. 17

VHJ-0073



No. 18

4-2-2. Connection Method 1 (See Fig. 4-2-2) (For “Mid mount” model)

1) Remove the 7-wire cable connected from the system control circuit to the connector (CN822) of the MC-3 board.
2) Connect the 7-wire cable (VHJ-0076) between the connector (CN822) of the MC-3 board and the 7-pin connector of the Mode Selector Connection Board (VHJ-0075).
3) Remove the 6-wire cable extending from the cassette holder section from the connector of the System Control Circuit Board and connect it to the 6-pin connector of the Mode Selector Connection Board (VHJ-0075).
4) Connect a supplied 26-pin flat cable (VHJ-0064) of the mode selector (VHJ-0050) between the mode selector body and the 26-pin connector of the Connection Board (VHJ-0075).

Note: Care should be taken to avoid mistaking the direction of the contacting side when connecting a flexible flat cable.

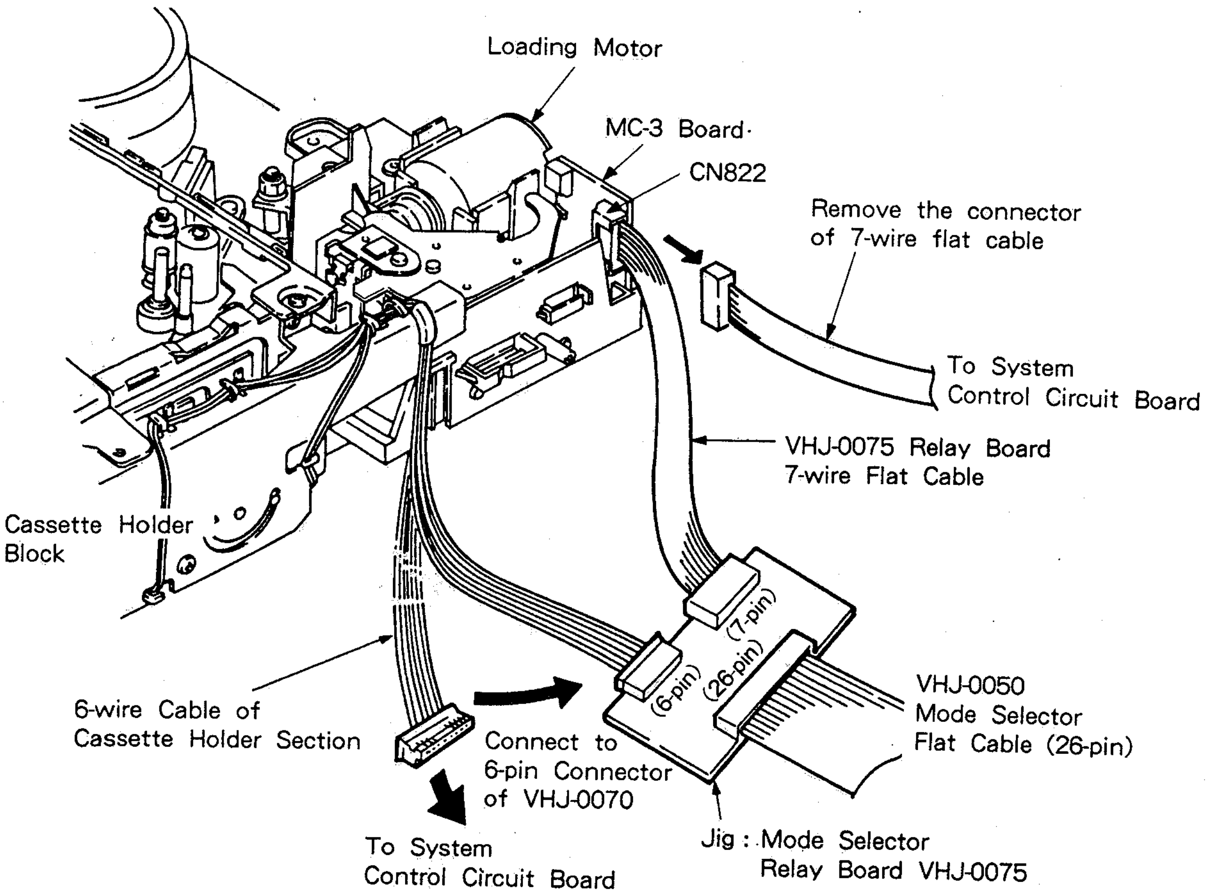

Loading Motor
MC-3 Board
CN822
Remove the connector of 7-wire flat cable
To System Control Circuit Board
VHJ-0075 Relay Board 7-wire Flat Cable
Cassette Holder Block
(7-pin)
(26-pin)
(6-pin)
VHJ-0050 Mode Selector Flat Cable (26-pin)
6-wire Cable of Cassette Holder Section
Connect to 6-pin Connector of VHJ-0070
To System Control Circuit Board
Jig : Mode Selector Relay Board VHJ-0075

Fig. 4-2-2. Connection

[Page 30]

4-2-3. Connection Method 2 (See Fig. 4-2-3) (For compact size model)

1) Remove the 24-pin flat cable extending from the COMPL MC-2 board connector (CN811) from the connector of the system control circuit board, and connect it to the 24-pin connector of mode selector relay board (VHJ-0089).
2) Remove the 6-wire cable extending from the cassette holder section from the connector of the system control circuit board and connect it to the 6-pin connector of the mode selector relay board (VHJ-0089).
3) Connect a supplied 26-pin flat cable (VHJ-0064) of the mode selector (VHJ-0050) between the mode selector body and the 26-pin connector of the mode selector relay board (VHJ-0089).

Note: Care should be taken to avoid mistaking the direction of the contacting side when connecting a flexible flat cable.

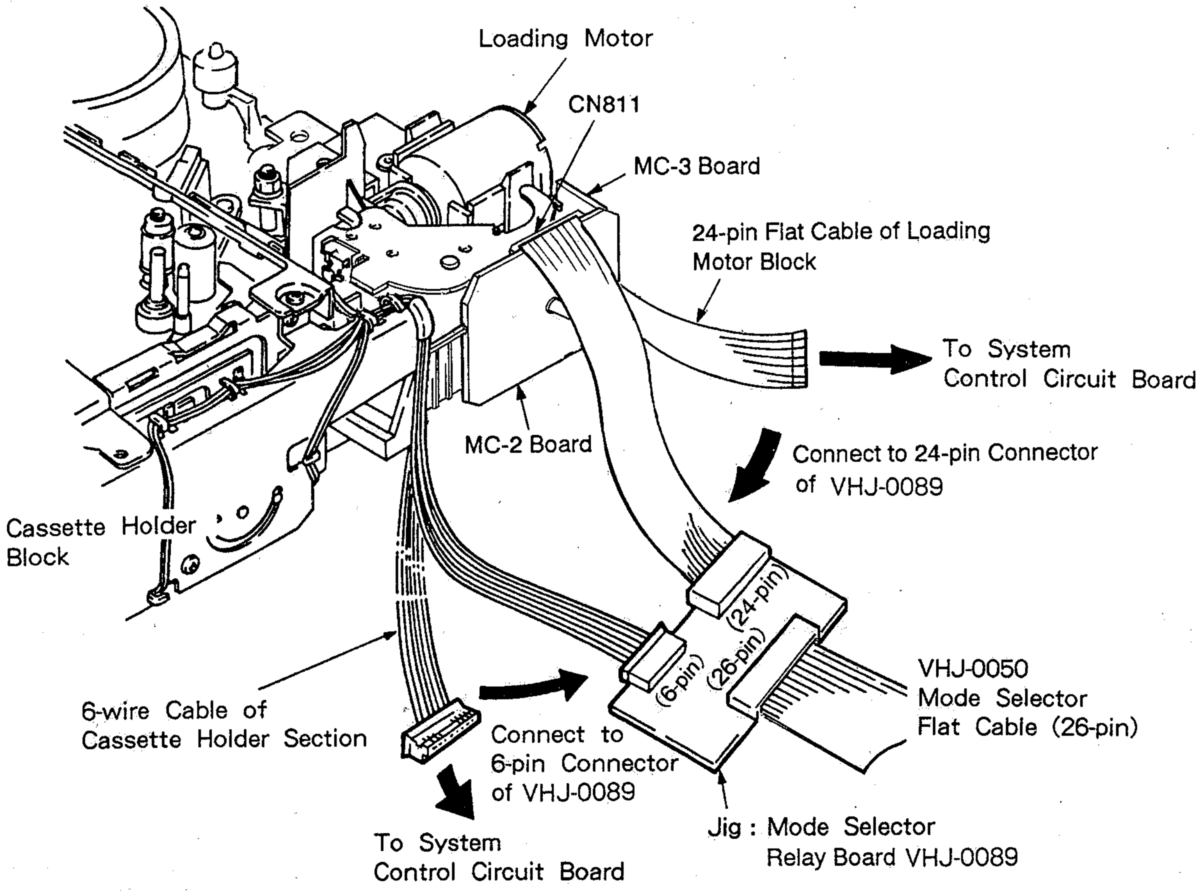

Loading Motor
CN811
MC-3 Board
24-pin Flat Cable of Loading Motor Block
To System Control Circuit Board
MC-2 Board
Connect to 24-pin Connector of VHJ-0089
Cassette Holder Block
(24-pin)
(26-pin)
(6-pin)
VHJ-0050 Mode Selector Flat Cable (26-pin)
6-wire Cable of Cassette Holder Section
Connect to 6-pin Connector of VHJ-0089
To System Control Circuit Board
Jig : Mode Selector Relay Board VHJ-0089

Fig. 4-2-3. Connection

5-2-2. Gear Bracket Ass'y (See Fig. 5-2-2.)

1. Removal

1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
2) Remove the three screws ①, then remove the GEAR BRACKET ASS'Y ② as shown in Fig. A.
3) Remove the E ring ③, then remove the LOCK GEAR ④, the PINION LEVER ASS'Y ⑤, the PINION GEAR ⑥ and the RACK ⑦, in that order.

2. Remounting

1) Apply grease to the shaft ⑧ and the two pins ⑨ of the GEAR BRACKET ASS'Y.
2) Apply grease to the pin ⑩ of the PINION LEVER ASS'Y.
3) Apply grease to the toothed part of the RACK ⑦.
4) Fit the RACK ⑦ onto the two pins ⑨. Align the positioning alignment hole ⑪ to the positioning alignment hole ⑫ of the GEAR BRACKET.
5) Mount the PINION GEAR ⑥, PINION LEVER ASS'Y ⑤, and LOCK GEAR ④ in the shaft ⑧ in the order mentioned.
   Align the positioning alignment holes ⑬ of PINION GEAR and LOCK GEAR with the positioning alignment hole ⑪ of RACK at that time.
6) Mount the E ring ③ onto the shaft ⑧.
7) Set the GEAR BRACKET ASS'Y ② to the dowel and mount it using three screws ①.
   Align the positioning alignment hole Ⓐ of the IDLER GEAR with the positioning alignment hole Ⓑ of the SIDE BOARD as shown in Fig. 5-2-3 at this time.
   Also align the positioning alignment holes ⑬ of PINION GEAR and LOCK GEAR with the positioning alignment hole ⑫ of GEAR BRACKET by referring to Fig. 5-2-2. After mounting them, check to be sure that FL START SWITCH ⑭ is in the ON state shown in Fig. A.
8) Remount the COMPL CASSETTE MECHANISM as instructed in 5-2-1.

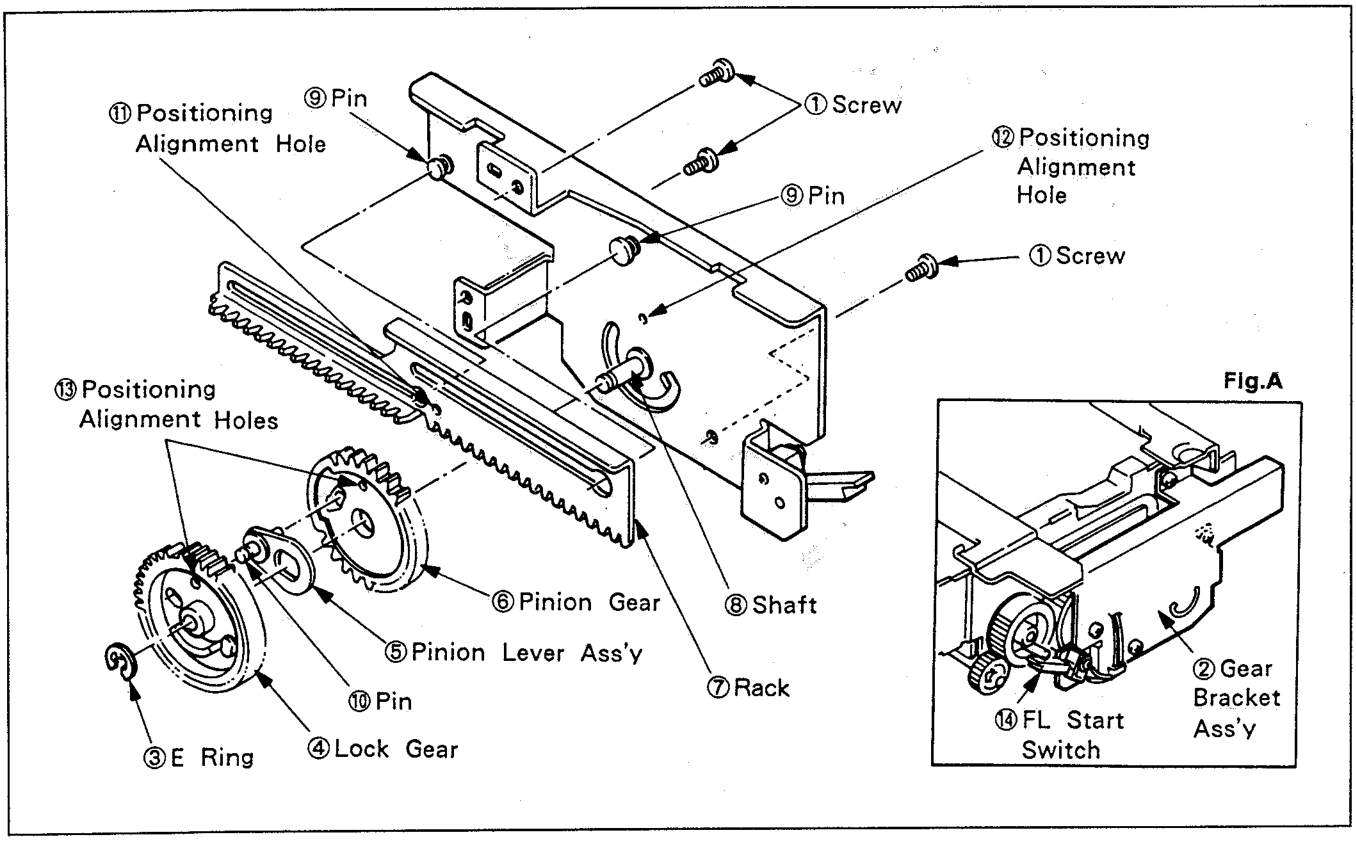

⑪Positioning Alignment Hole
⑨Pin
①Screw
⑫Positioning Alignment Hole
⑨Pin
①Screw
⑬Positioning Alignment Holes
⑥Pinion Gear
⑧Shaft
⑤Pinion Lever Ass'y
⑦Rack
⑩Pin
③E Ring
④Lock Gear
Fig.A
②Gear Bracket Ass'y
⑭FL Start Switch

Fig. 5-2-2. Gear Bracket Ass'y

5-2-4. Cassette Drive Gear (left) (See Fig. 5-2-4)

1. Removal

1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
2) Remove the E ring ②.
3) Open the hook ③, then remove the LEVER GEAR ASS'Y L ④. Take care not to open the hook ③ too much, otherwise it may get deformed or broken. If it does, replace it.
4) Remove the SPRING COIL ⑤ from the LEVER GEAR ASS'Y L ④.

2. Remounting

1) Apply grease to the axle ⑨ and shaft ⑩.
2) Align with the COUPLE GEAR L ⑬ and the IDLER GEAR L ⑥ as shown in Fig B.
3) Hook the SPRING COIL ⑤ to the LEVER GEAR ASS'Y L ④.
4) Mount the LEVER GEAR ASS'Y L ④ onto the axle ⑨ and the shaft ⑩. Align with the IDLER GEAR L ⑥ as shown in Fig. B.
5) Mount the COMPL CASSETTE MECHANISM onto the chassis as instructed in 5-2-1.

Note: The end of the DOOR OPEN LEVER ⑦ leans against the front side of the CASSETTE DOOR ⑪ as shown in Fig. A.

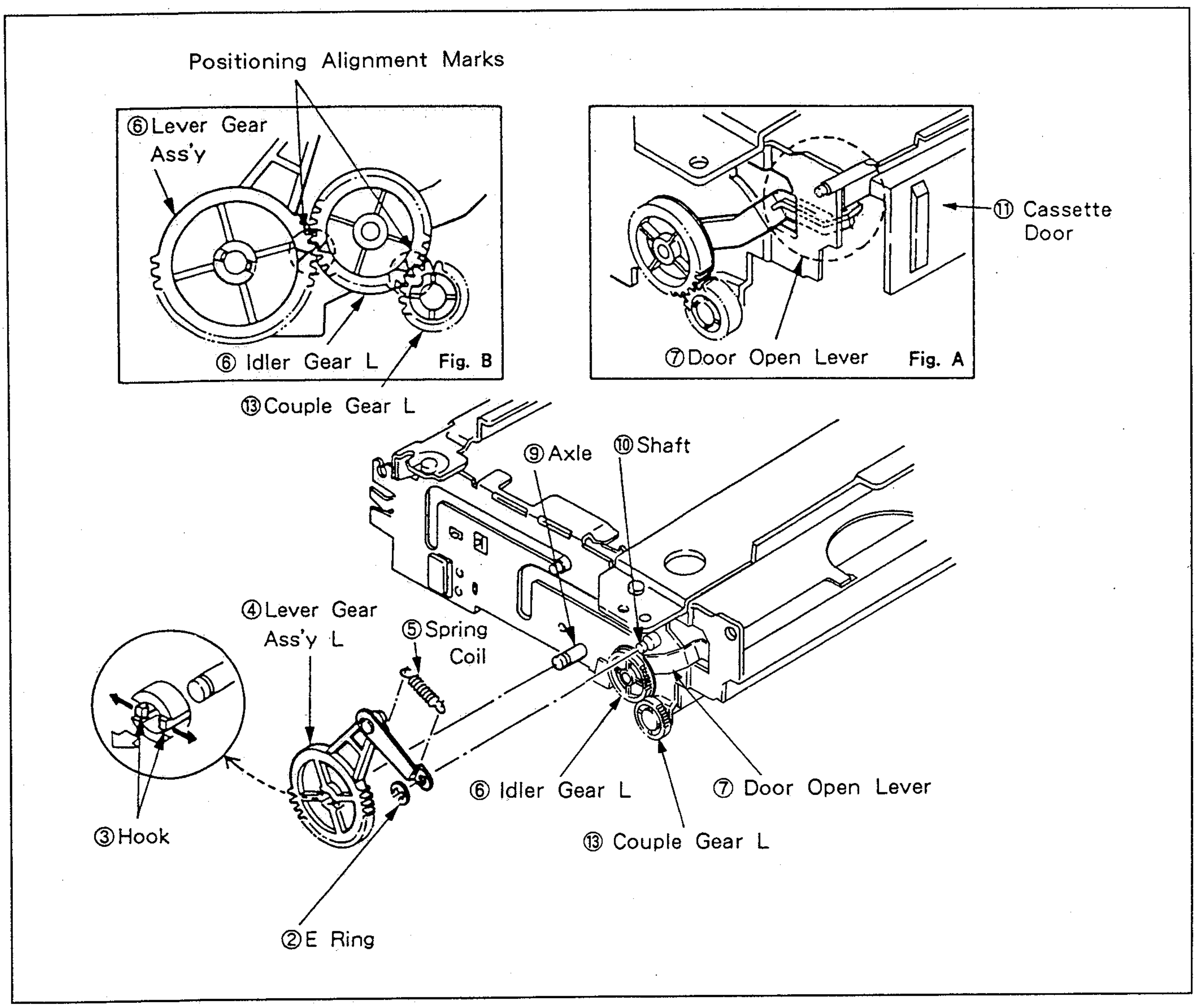

Positioning Alignment Marks
⑥Lever Gear Ass'y
⑥ Idler Gear L
Fig. B
⑬Couple Gear L
⑪ Cassette Door
⑦Door Open Lever
Fig. A
⑨Axle
⑩Shaft
④Lever Gear Ass'y L
⑤Spring Coil
③Hook
⑥ Idler Gear L
⑦ Door Open Lever
⑬ Couple Gear L
②E Ring

Fig. 5-2-4. Cassette Drive Gears (Left Side)

5-4. TAPE LOADING MECHANISM

5-4-1. Main Parts of the Tape Loading Mechanism (See Fig. 5-4-1.)

1. Removal

1) Remove connectors from the DRUM MOTOR board (SV-5).
2) Remove the three screws ①, then remove the REINFORCE BRACKET ②.
3) Remove the three special washers ③ and ⑦, then remove the spacer ⑥, LOAD RACK ④ and MAIN CAM ⑧.
4) Unhook the LOAD GEAR T hook ⑩, then remove the LOAD GEAR T ⑨ as shown in Fig. A, with the SPRING COIL ⑪ and the LOAD LEVER ASS'Y T ⑫ attached to it.
5) Unhook the LOAD GEAR S hook ⑭, then remove the LOAD GEAR S ⑬ as shown in Fig. B, with the SPRING COIL ⑮ and the LOAD LEVER ASS'Y S ⑯ attached to it.

Note: Take care not to open the LOAD GEAR hooks too much, otherwise they may be deformed or broken. If they are, replace them.

2. Remounting

1) Apply grease to the hole ⑰ of the LOAD LEVER ASS'Y S ⑯, as shown in Fig. B.
2) Apply grease to the hole ㉒ of the LOAD LEVER ASS'Y T ⑫ as shown in Fig. A, and to the sections of the LOAD GEAR T ⑨ as indicated with an arrow in Fig. C.
3) Apply grease to GROOVE 1, GROOVE 2 and to the outer side of the MAIN CAM ⑧, shown in Fig. E.
4) Apply grease to the three oval holes of the LOAD RACK ④ as shown in Fig. D.
5) Apply grease to the outer surface of axles ⑲, ⑳ and ㉘.
6) After assembling as shown in Fig. B, mount the LOAD GEAR S ⑬ onto the axle ⑲. Insert the ROLLER BASE S pin ⑱ into the hole ⑰ of the LOAD LEVER ASS'Y S.
7) After assembling as shown in Fig. A, mount the LOAD GEAR T ⑨ onto the axle ⑳. When doing so, align the INITIAL mode positioning alignment holes ㉑ of the LOAD GEAR S ⑬ and the LOAD GEAR T ⑨ to the INITIAL mode position. Insert the ROLLER BASE T pin ㉓ into the hole ㉒ of the LOAD LEVER ASS'Y T ⑫.
8) Mount the MAIN CAM ⑧ onto the axle ㉖. At that time, make sure that the INITIAL mode positioning alignment holes ㉕ of the MAIN CAM ⑧ and the MODE CAM ㉔ match the INITIAL mode positioning alignment holes ㉞ of the MECHANISM CHASSIS. Also check to be sure that the pin ㉗ of the CAM PINCH LEVER ASS'Y is put in the GROOVE 1 of the MAIN CAM as shown in Fig. E.
9) Mount the LOAD RACK ④ onto the axles ㉖ and ㉛. At that time, set the INITIAL mode positioning alignment marks ㉚ of the LOAD RACK ④ and the LOAD GEAR T ⑨ to the INITIAL mode position. Insert the LOAD RACK pin ㉙ into the MAIN CAM GROOVE 2 as shown in Fig. E.
10) Mount the spacer ⑥ and the special washer ⑦ onto the axle ㉖.
11) Mount the two special washers ③ onto the two axles ㉛.
12) Mount the REINFORCE BRACKET ② with the three screws ①.
13) Insert the connector into the DRUM MOTOR board (SV-5).
14) Confirm that loading and unloading are performed smoothly.

Note: Be sure to perform INITIAL mode positioning of cams and gears precisely.

[Page 43]

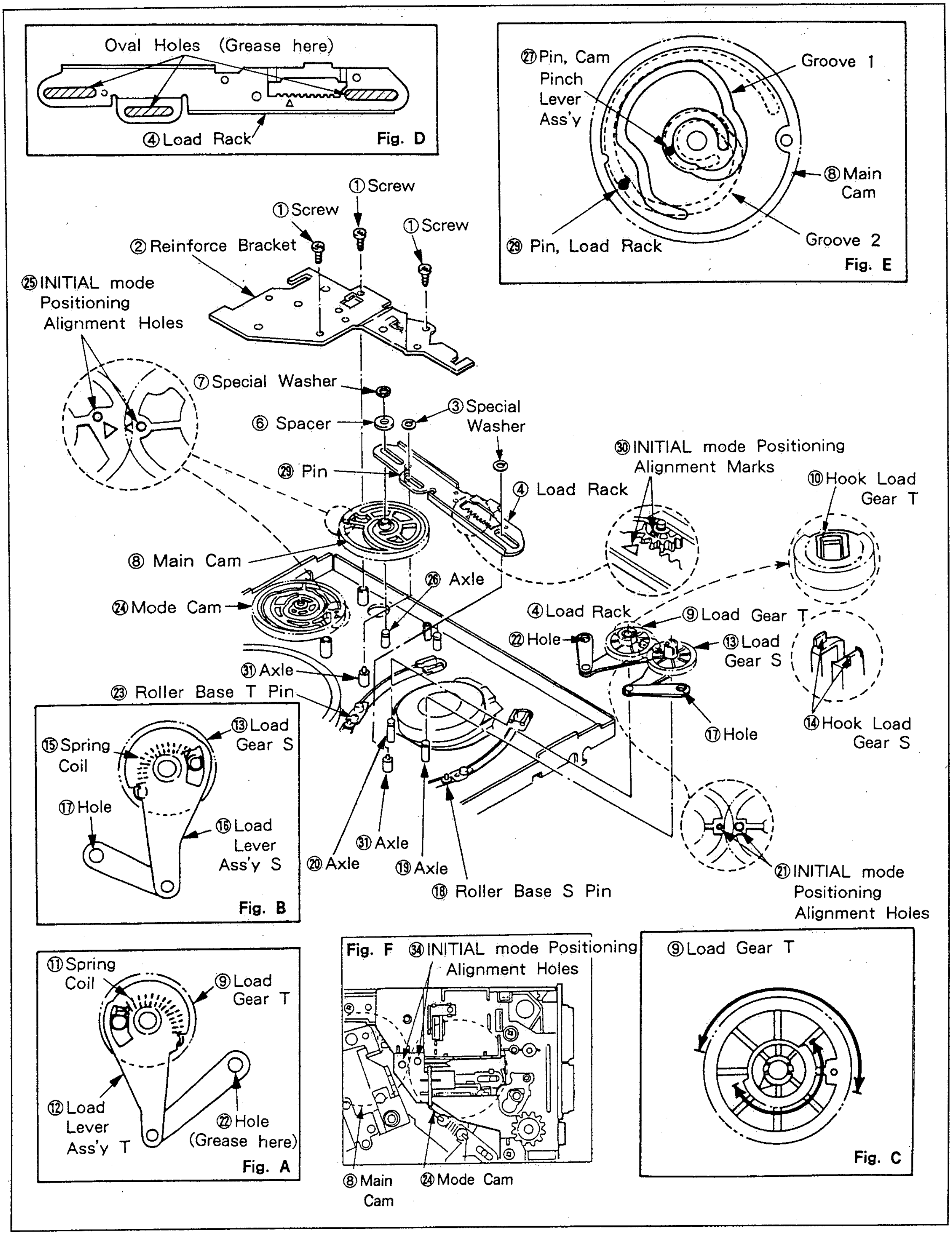

Oval Holes (Grease here)
④Load Rack
Fig. D
㉗Pin, Cam Pinch Lever Ass'y
Groove 1
⑧Main Cam
Groove 2
㉙ Pin, Load Rack
Fig. E
①Screw
①Screw
①Screw
②Reinforce Bracket
㉕INITIAL mode Positioning Alignment Holes
⑦Special Washer
⑥ Spacer
③Special Washer
㉙ Pin
㉚INITIAL mode Positioning Alignment Marks
④ Load Rack
⑩Hook Load Gear T
⑧ Main Cam
㉖ Axle
㉔Mode Cam
④Load Rack
⑨Load Gear T
㉒Hole
⑬Load Gear S
㉛Axle
㉓ Roller Base T Pin
⑰Hole
⑭Hook Load Gear S
⑮Spring Coil
⑬Load Gear S
⑰Hole
⑯Load Lever Ass'y S
Fig. B
㉛Axle
⑳Axle
⑲Axle
⑱ Roller Base S Pin
㉑INITIAL mode Positioning Alignment Holes
⑪Spring Coil
⑨Load Gear T
⑫Load Lever Ass'y T
㉒Hole (Grease here)
Fig. A
Fig. F
㉞INITIAL mode Positioning Alignment Holes
⑧Main Cam
㉔Mode Cam
⑨Load Gear T
Fig. C

Fig. 5-4-1. Loading Mechanism Main Parts

5-6. PINCH ROLLER PRESSURE MECHANISM (See Fig. 5-6-1.)

1. Removal

1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
2) Remove the COMPL HEAD BRACKET as instructed in 5-5.
3) Remove the PINCH SPRING COIL ①.
4) Remove the special washer ②, then remove the PINCH LEVER ASS'Y ③.
5) Remove the REV GUIDE LEVER SPRING COIL ④.
6) Remove REV GUIDE LEVER ASS'Y ⑥ from the hook ⑤ of the plastic bearing on the bottom side. Use a jig VHJ-0073 shown in Fig. 5-6-2 to widen the hook of the plastic bearing. By so doing, the above removal of the REV GUIDE LEVER ASS'Y ⑥ can be made more easily. Care should be taken to avoid pushing the jig VHJ-0073 too much. Pushing it too hard may damage the hook in an extreme case.
7) Remove the SLIDE BRAKE SPRING COIL ⑦.
8) Remove the special washer ⑧, then remove the PINCH CAM LEVER ASS'Y ⑨.
9) Remove the ACT PINCH SLIDE ASS'Y ⑩.

Note: If the hook ⑤ of the plastic bearing is damaged, reference should be made to Section 3. "Method of Repairing the Bearing Section of REV GUIDE LEVER ASS'Y".

2. Remounting

1) Apply grease to pins ⑫/⑬ and axles ⑯/⑱.
2) Apply grease to the ACT PINCH SLIDE ASS'Y pin ⑰.
3) Set the INITIAL mode with the mode selector (VHJ-0050).
4) Mount the ACT PINCH SLIDE ASS'Y ⑩ onto pins ⑫ and ⑬.
5) Insert the pin ⑭ of the PINCH CAM LEVER ASS'Y ⑨ into the MAIN CAM ⑪ GROOVE 1, and mount onto the axle ⑯ while inserting the ACT PINCH SLIDE ASS'Y pin ⑰ of the ACT PINCH SLIDE ASS'Y into the hole ⑮.
6) Mount the special washer ⑧ onto the axle ⑯.
7) Hook the SLIDE BRAKE SPRING COIL ⑦ to the plastic pin ⑲.
8) Mount the REV GUIDE LEVER ASS'Y ⑥ to the plastic molding bearing, then fix it with the hook ⑤ at the bottom.
9) Hook the REV GUIDE LEVER SPRING COIL ④.
10) Mount the PINCH LEVER ASS'Y ③ to the axle ⑱.
11) Mount the special washer ② to the axle ⑱.
12) Hook the PINCH SPRING COIL ① between the ACT PINCH SLIDE ASS'Y ⑩ and the PINCH LEVER ASS'Y ③.
13) Mount the COMPL HEAD BRACKET as instructed in 5-5.
14) Mount the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
15) Perform ACE head adjustment as instructed in 6-4.

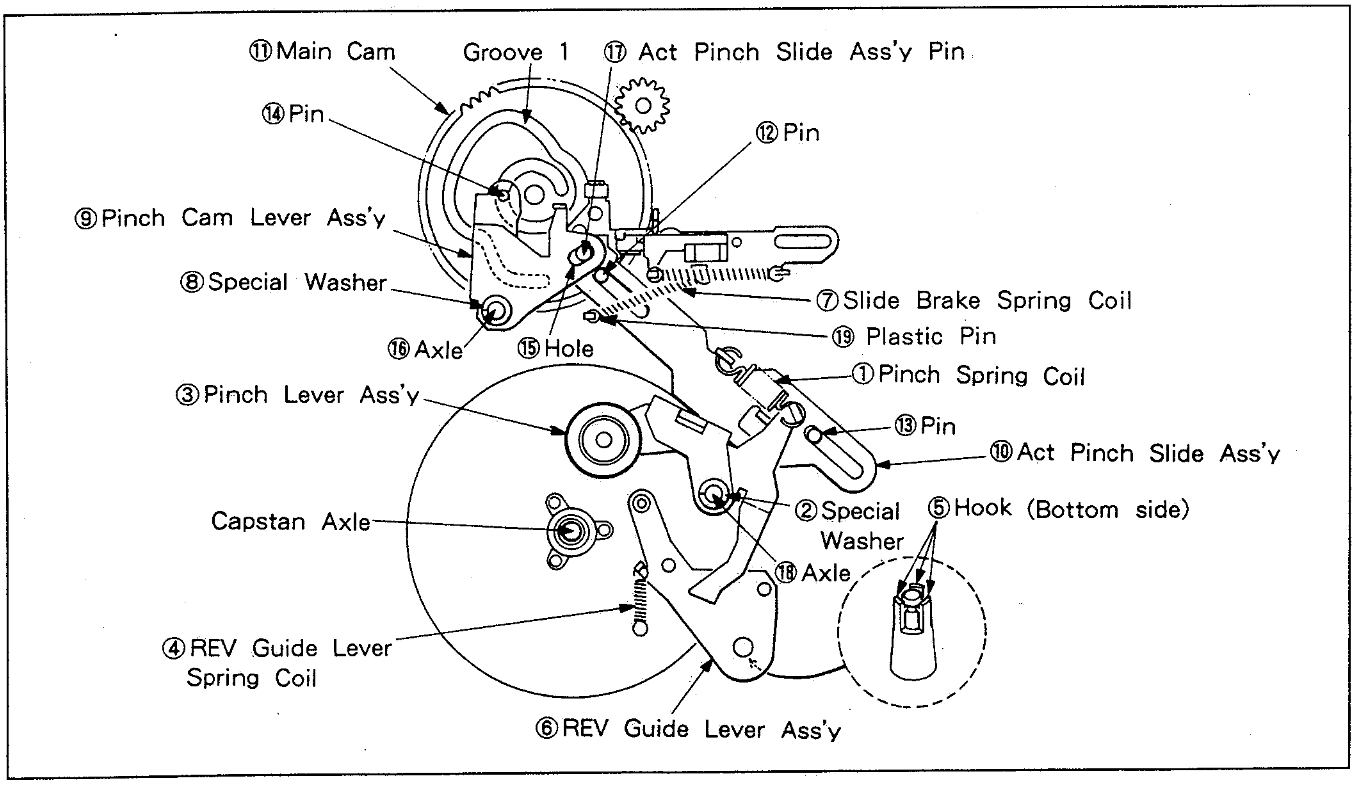

⑪Main Cam
Groove 1
⑰ Act Pinch Slide Ass'y Pin
⑭Pin
⑫Pin
⑨Pinch Cam Lever Ass'y
⑧Special Washer
⑦Slide Brake Spring Coil
⑲ Plastic Pin
⑯Axle
⑮Hole
①Pinch Spring Coil
③Pinch Lever Ass'y
⑬Pin
⑩Act Pinch Slide Ass'y
Capstan Axle
②Special Washer
⑤Hook (Bottom side)
⑱Axle
④REV Guide Lever Spring Coil
⑥REV Guide Lever Ass'y

Fig. 5-6-1. Pinch Roller Pressure Mechanism

5-8-4. Reel Pulley and Friction Gear Ass'y (See Fig. 5-8-4.)

1. Removal

1) Remove the REEL DRIVE BELT ③.
2) Remove the special washer ④, then remove the REEL PULLEY ⑤.
3) Remove the special washer ⑥, then remove the FRICTION GEAR ASS'Y ⑦ and the washer ⑧.

2. Remounting

1) Apply one drop of oil to the parts of axles ⑨ and ⑩ indicated with arrows.
2) Mount the washer ⑧ and the FRICTION GEAR ASS'Y ⑦ onto the axle ⑨.
3) Mount the special washer ⑥ onto the axle ⑨.
4) Mount the REEL PULLEY ⑤ onto the axle ⑩.
5) Mount the special washer ④ onto the axle ⑩.
6) Set the REEL DRIVE BELT ③.

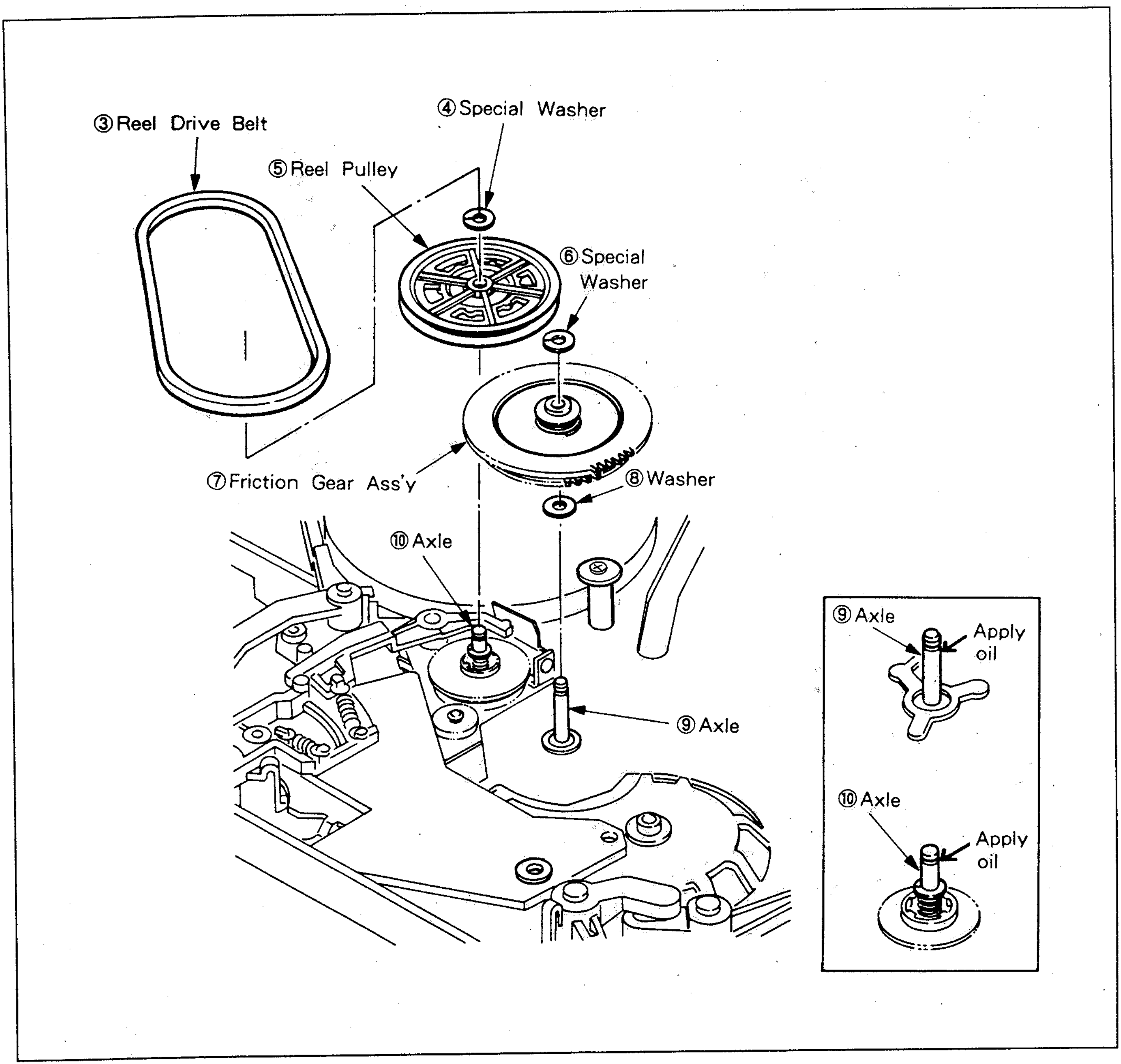

③Reel Drive Belt
④Special Washer
⑤Reel Pulley
⑥Special Washer
⑦Friction Gear Ass'y
⑧Washer
⑩Axle
⑨Axle
⑨Axle
Apply oil
⑩Axle
Apply oil

Fig. 5-8-4. Reel Pulley & Friction Gear

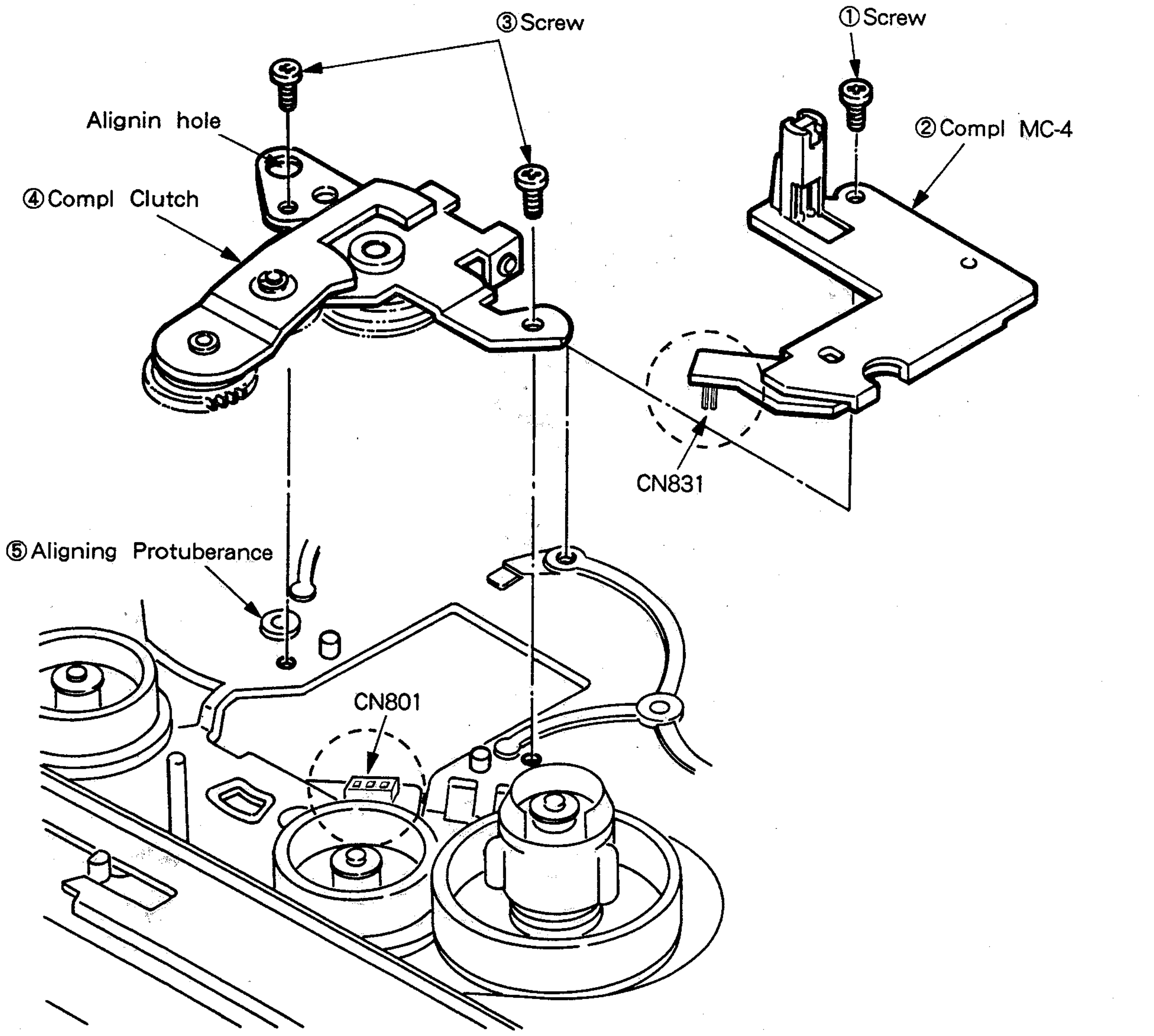
5-8-5. COMPL Clutch (See Fig. 5-8-5.)

1. Removal

1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
2) Remove the REEL DRIVE BELT and the REEL PULLEY as instructed in 5-8-4.
3) Remove the screw ①, then remove the COMPL MC-4 ②.
4) Remove the two screws ③, then remove the COMPL CLUTCH ④.

2. Remounting

1) Mount the COMPL CLUTCH ④ with the two screws ③, aligning it with the protuberance ⑤.
2) After inserting the CN831 (COMPL MC-4) into the CN801 (COMPL MC-1), mount the COMPL MC-4 with the screw ①.
3) Mount the REEL PULLEY and REEL DRIVE BELT as instructed in 5-8-4.
4) Mount the COMPL CASSETTE MECHANISM as instructed in 5-2-1.


③Screw
①Screw
Alignin hole
②Compl MC-4
④Compl Clutch
CN831
⑤Aligning Protuberance
CN801

Note: The form of CN801 and CN831 differ from the P90 mechanism.

Fig. 5-8-5. Compl Clutch

[Page 59]

5-10. FIXED GUIDE, FE HEAD LEVER ASS'Y

5-10-1. S-Side Fixed Guide and FE Lever Ass'y (See Fig. 5-10-1.)

1. Removal

1) Remove the special nut ①, then remove the GUIDE PIPE ③ and the special washer ② (lower), in that order.
2) Remove the SPRING COIL ⑤.
3) Remove the FTE HEAD connector, then remove the FE HEAD LEVER ASS'Y ⑦.

2. Remounting

1) Mount the FE LEVER ASS'Y ⑦ onto the axle ⑧.
2) Hook the SPRING COIL ⑤ between the chassis notch ⑨ and the FE LEVER ASS'Y hook ⑩.
3) Mount the special washer ② (lower), the GUIDE pipe ③ and the special nut ① to the axle ⑧, in that order. At that time, do not excessively tighten the special nut ① to avoid idle rotation of the axle rivet. The height of fixing guide on the inlet side is not required.
4) Connect the connector to the FTE HEAD.

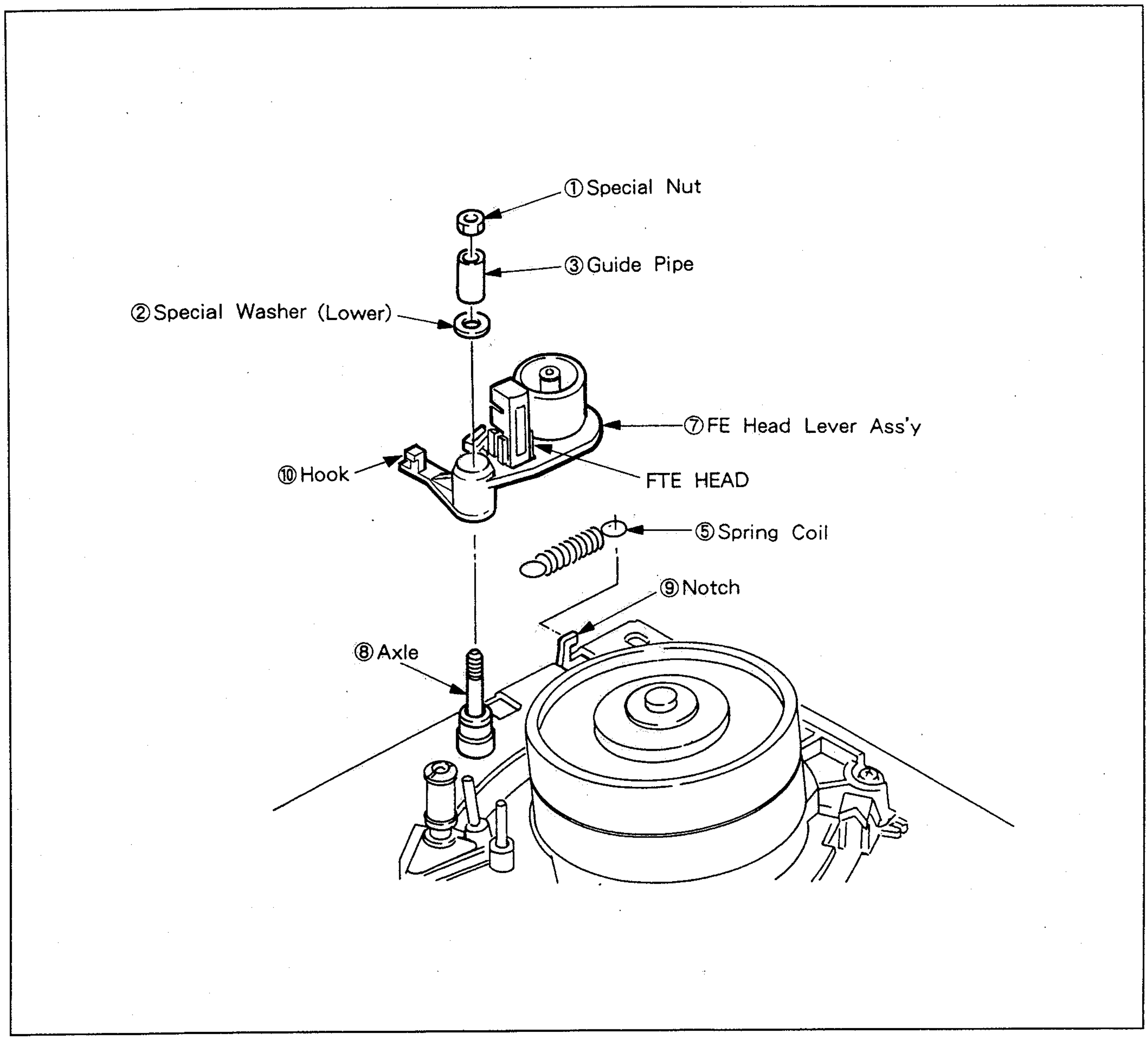

①Special Nut
③Guide Pipe
②Special Washer (Lower)
⑦FE Head Lever Ass'y
⑩Hook
FTE HEAD
⑤Spring Coil
⑨Notch
⑧Axle

Fig. 5-10-1. Fixed Guide (S) & FE Lever Ass'y

5-10-3. Exit side Fixed Guide (See Fig. 5-10-3.)

1. Removal

1) Remove the CAP ①.
2) Remove the special NUT ②, then remove the special washer ③ (upper), the GUIDE PIPE ④, the special washer ③ (lower) and the sleeve ⑤, in that order.

2. Remounting

1) Mount the sleeve ⑤, the special washer ③ (lower), the GUIDE PIPE ④, the special washer ③ (upper) and the special NUT ②, in that order, to the axle ⑥.
2) Mount the CAP ① onto the axle ⑥.

Note: There is no need of height adjustment of the exit side fixed guide.

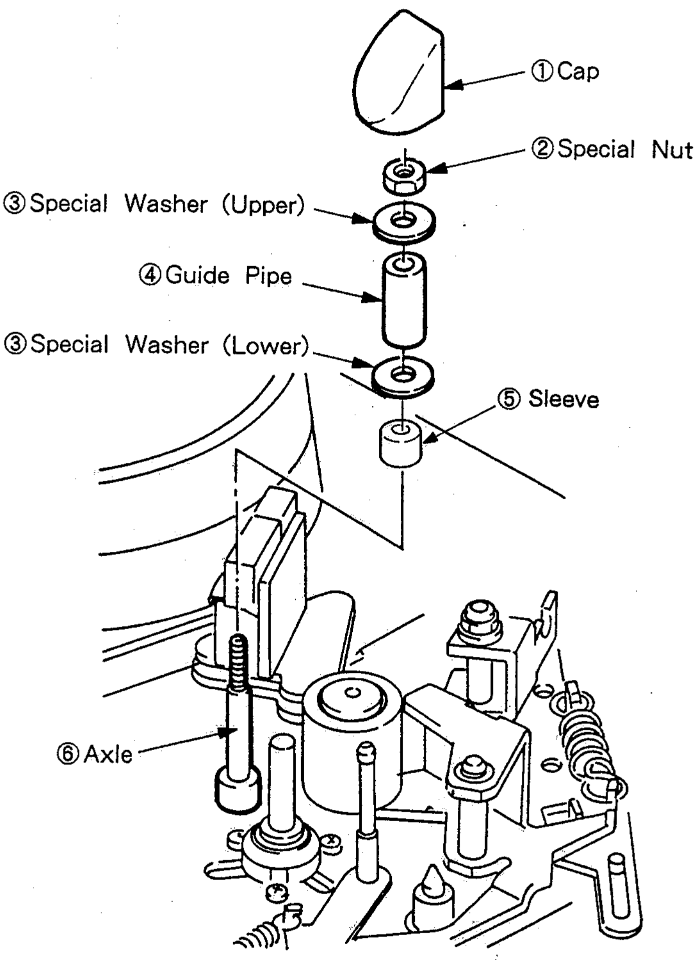

①Cap
②Special Nut
③Special Washer (Upper)
④Guide Pipe
③Special Washer (Lower)
⑤ Sleeve
⑥Axle

Fig. 5-10-3. Fixed Guide (T)

5-13. AUTO HEAD CLEANER MECHANISM (See. Fig. 5-13-1 • Fig. 5-13-2 • Fig. 5-13-3)

1. Removal

Note:
- Do not hold the ROLLER CLEANER ASS'Y ① by bare hand. Use tweezers and gloves not soiled with grease or dust, etc.
- When the cleaning function deteriorates and replacing only ROLLER CLEANER ASS'Y ①, there is no need to perform item 4).

1) Make sure that the ROLLER CLEANER ASS'Y ① is not pressed against a drum (cylinder).
2) Remove the PRE-AMP UNIT and the PRE-AMP BRACKET.
3) Remove screw ②, then lift up and remove the BRACKET CLEANER ASS'Y ③.
4) With the BRACKET CLEANER ASS'Y ③ is fixed by finger, turn the LEVER CLEANER ASS'Y ④ 35° to 40° to clockwise, then lift up and remove.
5) Remove the stop washer ⑤, then remove the ROLLER CLEANER ASS'Y ①.

2. Remounting

1) Mount the ROLLER CLEANER ASS'Y ① and the stop washer ⑤ to the axle ⑥ of LEVER CLEANER ASS'Y.
   Mount the ROLLER CLEANER ASS'Y ① so that the mark shown in Fig. 5-13-2 is up side. If the mark is down side, noise may occur.
2) Mount the SPRING COIL ⑧ and the LEVER CLEANER ASS'Y ④ to the axle ⑦ of BRACKET CLEANER ASS'Y. At this time, hook the SPRING COIL ⑧ to the hole ⑨ of the LEVER CLEANER ASS'Y and the bent part ⑩ of the BRACKET CLEANER ASS'Y. "A part" of the LEVER CLEANER ASS'Y should be under "B part" of the BRACKET CLEANER ASS'Y.
3) Fix the BRACKET CLEANER ASS'Y ③ on screw hole ⑫ by screw ②. Before fasten screw ②, insert hole ⑪ of the BRACKET CLEANER ASS'Y to axle ⑯, axle ⑦ to hole ⑬ to match positions. Pin ⑭ of the LEVER CLEANER ASS'Y should be run along the circumference of the MAIN CAM ⑮ not to be came off.
4) The upper side of the lower drum should be within approx. 2mm from the lower side of the ROLLER CLEANER ASS'Y as shown in Fig. 5-13-3.
5) Mount the PRE-AMP BRACKET and the PRE-AMP UNIT.

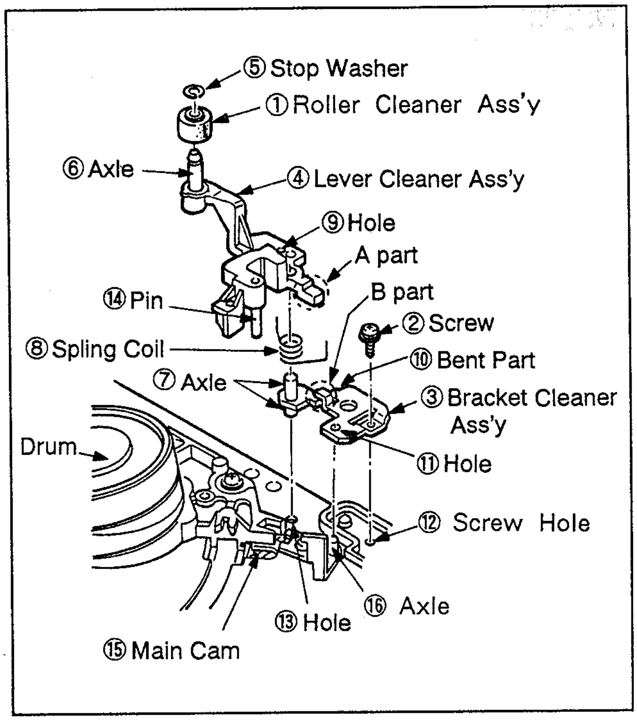

⑤Stop Washer
①Roller Cleaner Ass'y
⑥Axle
④Lever Cleaner Ass'y
⑨Hole
A part
B part
⑭Pin
②Screw
⑧Spling Coil
⑩Bent Part
⑦Axle
③Bracket Cleaner Ass'y
Drum
⑪Hole
⑫ Screw Hole
⑯ Axle
⑬Hole
⑮Main Cam

Fig. 5-13-1

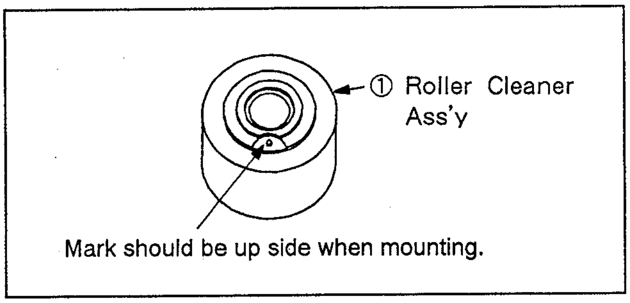

① Roller Cleaner Ass'y
Mark should be up side when mounting.

Fig. 5-13-2

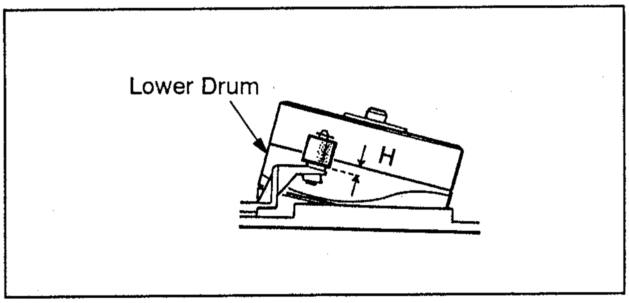

Lower Drum
H

Fig. 5-13-3

MEMO

SANYO Electric Co., Ltd.
Osaka, Japan

Jan./92/12000 SU Printed in Japan